2011 DURAMAX Diesel Engine (LML/LGH)

In Brief 1-1
Initial Drive Information 1-1
Performance and Maintenance 1-2

Instruments and Controls 5-1
Warning Lights, Gauges, and Indicators 5-2
Information Displays 5-10
Vehicle Messages 5-10
Vehicle Personalization 5-14

Driving and Operating 9-1
Starting and Operating 9-1
Engine Exhaust 9-10
Brakes 9-15
Fuel 9-16
Towing 9-35
Conversions and Add-Ons ... 9-39

Vehicle Care 10-1
General Information 10-1
Vehicle Checks 10-4
Electrical System 10-28

Service and Maintenance ... 11-1
General Information 11-1
Scheduled Maintenance 11-2
Recommended Fluids, Lubricants, and Parts 11-8
Maintenance Records 11-12

Technical Data 12-1
Vehicle Data 12-2

Index i-1

The names, logos, emblems, slogans, vehicle model names, and vehicle body designs appearing in this manual including, but not limited to, GM, the GM logo, CHEVROLET, GMC, the CHEVROLET and GMC Truck Emblems, SILVERADO, SIERRA, DENALI, EXPRESS, SAVANA, and Duramax are trademarks and/or service marks of General Motors LLC, its subsidiaries, affiliates, or licensors.

This manual describes features that may or may not be on your specific vehicle either because they are options that you did not purchase or due to changes subsequent to the printing of this owner manual. Please refer to the purchase documentation relating to your specific vehicle to confirm each of the features found on your vehicle. For vehicles first sold in Canada, substitute the name "General Motors of Canada Limited" for GMC and Chevrolet Motor Division wherever it appears in this manual.

This manual contains information that pertains to the operation of your diesel engine. It also contains your Diesel Maintenance Schedule. The sections in this manual correspond to the sections in your owner manual. This manual, along with your owner manual, will assist you in the proper use and maintenance of your vehicle.

Keep this manual in the vehicle for quick reference.

Canadian Vehicle Owners

Propriétaires Canadiens

A French language copy of this manual can be obtained from your dealer or from:

On peut obtenir un exemplaire de ce guide en français auprès du concessionnaire ou à l'adresse suivante:

Helm, Incorporated
P.O. Box 07130
Detroit, MI 48207

1-800-551-4123
Numéro de poste 6438 de langue française
www.helminc.com

Litho in U.S.A.
Part No. 22743552 B Third Printing

©2010 General Motors LLC. All Rights Reserved.

Using this Supplement

This supplement contains information specific to the unique components of the vehicle. It does not explain everything you need to know about the vehicle. Read this supplement along with the owner manual to learn about the vehicle's features and controls.

Index

A good place to look for what you need is the Index in back of this supplement. It is an alphabetical list of what is in the supplement, and the page number where you will find it.

✍ NOTES

In Brief

Initial Drive Information
Transmission 1-1

Performance and Maintenance
Engine Oil Life System 1-2
Diesel Particulate Filter (Exhaust Filter) 1-3
Diesel Exhaust Fluid 1-5

Initial Drive Information

Transmission

Cold Operation (Allison Transmission)

When temperatures are very cold, the transmission will prevent certain operations to protect against damage. The chart below shows shift range availability based on transmission oil temperature:

- All shift ranges available at −25 C (−13 F) or above.
- 2 (Second) and 3 (Third) shift ranges only at −35 C (−31 F) to −25 C (−13 F).
- 2 (Second) shift range only at −35 C (−31 F) or lower.

Torque converter clutch operation will also be prevented when air or transmission oil temperatures are below certain levels.

For areas where ambient temperatures are below −40 C (−40 F), use synthetic transmission fluid approved to Allison Transmission specification TES-295. See *Recommended Fluids and Lubricants on page 11-8* and *Automatic Transmission Fluid on page 10-11*.

Adaptive Shift Controls

The shift quality of a new vehicle may not be ideal because the Adaptive Shift Control process may not have determined the best settings for a particular shift or condition. Shift quality will improve with continued driving.

Low Traction Mode (Allison Transmission)

Low Traction Mode aids in vehicle acceleration on slippery road surfaces such as ice or snow. By selecting 2 (Second) using Range Selection Mode while at a stop, the transmission will limit torque to the drive wheels to prevent slippage.

Heater Performance Mode (Allison Transmission)

When cold weather conditions are detected, the transmission raises part throttle upshift points after the 1 (First) to 2 (Second) upshift to increase engine speed. This feature shortens engine and cab warm up times.

When the transmission is in this mode, upshifts may be delayed. This is normal and does not indicate an operational problem.

Four Wheel Drive (Allison Transmission)

When operating in 4 ↓ (Four-Wheel-Drive Low), there is a very deep gear reduction. The resulting shifts will feel exaggerated.

Performance and Maintenance

Engine Oil Life System

The engine oil life system calculates engine oil life based on vehicle use and, on most vehicles, displays a DIC message when it is necessary to change the engine oil and filter. The oil life system should be reset only following an oil change.

Resetting the Oil Life System

To reset the Engine Oil Life System on van models:

1. Display the OIL LIFE REMAINING on the DIC.
2. Press and hold the SET/RESET button on the DIC for more than five seconds. The oil life will change to 100%.

To reset the Engine Oil Life System on most pickup models:

1. Display the OIL LIFE REMAINING on the DIC. If the vehicle does not have DIC buttons, the vehicle must be in P (Park) to access this display.
2. Press and hold the SET/RESET button on the DIC, or the trip odometer reset stem if the vehicle does not have DIC buttons, for more than five seconds. The oil life will change to 100%.

On all models, the Engine Oil Life System can be reset as follows:

1. Turn the ignition to ON/RUN with the engine off
2. Fully press the accelerator pedal slowly three times within five seconds.
3. Display the OIL LIFE REMAINING on the DIC. If the display shows 100%, the system is reset.
4. Turn the key to LOCK/OFF.

See *Engine Oil Life System on page 10-10*.

Diesel Particulate Filter (Exhaust Filter)

The Duramax engine is equipped with a Diesel Particulate Filter (DPF) that, by design, will filter or trap particulates. The DPF is located under the vehicle in the exhaust system and looks like a catalyst.

Depending on a number of factors monitored by the engine computer, the DPF will need to be cleaned of accumulated solids. When a cleaning is needed, the engine computer will initiate a cleaning action by warming the exhaust gas temperature. This feature has been designed to operate automatically, with limited operator involvement or awareness.

Cleaning the DPF (Exhaust Filter)

While the DPF cleaning is automatically controlled by the engine computer, the vehicle will need to operate continuously for approximately 30 minutes and at speeds greater than 48 km/h (30 mph) to clean the DPF effectively. If the vehicle is returned to idle during the cleaning process, the driver may notice a slightly different sound or a slightly elevated engine idle speed. This is normal. No action is required on the part of the driver during a regular DPF cleaning. See *Diesel Particulate Filter (Exhaust Filter) on page 9-10*.

Special DPF Driver Messages

If the vehicle is used for numerous short trips or extended slow-speed operation, the engine computer may not be able to adequately heat up the exhaust system to clean the DPF effectively. The engine computer has been designed to continuously monitor the condition of the DPF. When the engine computer detects that the DPF is nearly full of particulates and that the vehicle is not being operated in a manner that would allow effective automatic DPF cleaning, the Driver Information Center will display the message CLEANING EXHAUST FILTER KEEP DRIVING UNTIL MESSAGE IS CLEARED.

If the vehicle continues to be driven in a manner that prevents effective DPF cleaning, the DPF will become plugged with particulates. If this occurs, the engine computer will turn on the Service Engine Soon Light in the instrument cluster and the DIC will display the message REDUCED ENGINE POWER.

See *Diesel Particulate Filter (Exhaust Filter) on page 9-10* and *Engine Power Messages on page 5-11*.

Fuel

Use Ultra-Low Sulfur Diesel Fuel (ULSD)

Use Ultra-Low Sulfur Diesel Fuel (ULSD) only. The emission control hardware used on the vehicle may be damaged by using fuel with high sulfur levels. Use only fuel that is dispensed from pumps bearing the ULSD label.

Do Not Use Low Sulfur Diesel Fuel (LSD)

Do not use fuel that is dispensed from pumps bearing the LSD label.

Do Not Use Non-Highway Fuel

Fuel labeled as off road or non-highway is typically very high in sulfur content and will damage the emission control system. Non-Highway fuel is not intended for use in on-highway vehicles and does not have the fuel properties needed by the DPF-equipped Duramax Diesel.

In addition:

- Use the correct engine oil.
- Do not add gasoline to diesel fuel.
- Do not modify the induction or exhaust systems.

See *Fuel for Diesel Engines on page 9-16* and *Engine Oil on page 10-7*.

Diesel Exhaust Fluid

Diesel Exhaust Fluid (DEF) is used with diesel engines to reduce the amount of regulated emissions produced. The DEF system must be maintained for the vehicle to run properly.

Locating Diesel Exhaust Fluid

DEF can be purchased at a Chevrolet or GMC dealer. It can also be purchased at authorized vehicle and truck dealerships. Additionally, some diesel truck fuelling stations or retailers may also have DEF for purchase. For vehicles with an active OnStar® subscription, OnStar can help to locate a DEF retailer. For more information on locating DEF see www.afdc.energy.gov/afdc/vehicles/diesels_fluid.html. See “Customer Assistance Offices” in the owner manual for phone numbers to assist you in contacting a GM dealer. See *Recommended Fluids and Lubricants on page 11-8*.

As the DEF tank becomes low on fluid, warnings begin with approximately 1600 km (1000 miles) of remaining range. These warnings will increase in intensity as the tank becomes empty. Once the tank is empty, the vehicle will be speed limited to 89 km/h (55 mph) and eventually to 7km/h (4 mph). The tank should be refilled to avoid vehicle speed limitation. If there is an issue with the quality of the fluid or the exhaust fluid system, warnings will be displayed in the Driver Information Center (DIC).

The vehicle will have 322 km (200 miles) before being speed limited to 89 km/h (55 mph). If the vehicle continues to be driven in this condition, it will become speed limited to 7km/h (4 mph). See *Diesel Exhaust Fluid on page 9-12*.

✍ NOTES

Instruments and Controls

Warning Lights, Gauges, and Indicators

Instrument Cluster 5-2
Fuel Gauge 5-4
Engine Oil Pressure Gauge . . . 5-5
Malfunction Indicator Lamp . . . 5-6
Wait-to-Start Light 5-9
Diesel Exhaust Fluid (DEF) Warning Light 5-9

Information Displays

Driver Information Center (DIC) 5-10

Vehicle Messages

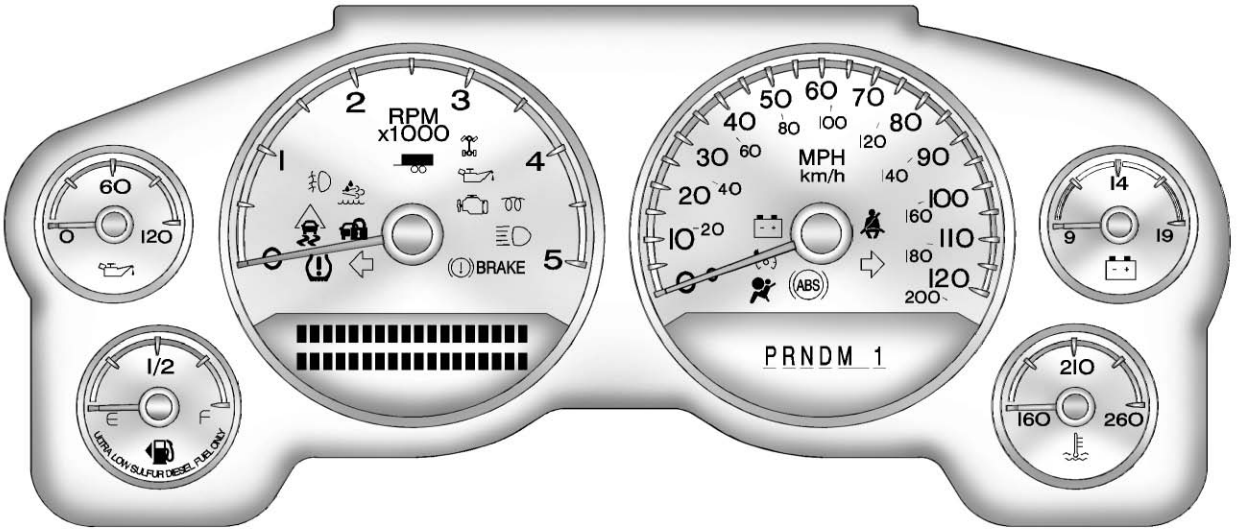
Vehicle Messages 5-10
Engine Cooling System Messages 5-11
Engine Oil Messages 5-11
Engine Power Messages 5-11
Fuel System Messages 5-11
Diesel Exhaust Fluid Messages 5-11
Diesel Particulate Filter Messages 5-12
Service Vehicle Messages . . . 5-12
Starting the Vehicle Messages 5-12
Transmission Messages 5-13
Vehicle Speed Messages 5-13

Vehicle Personalization

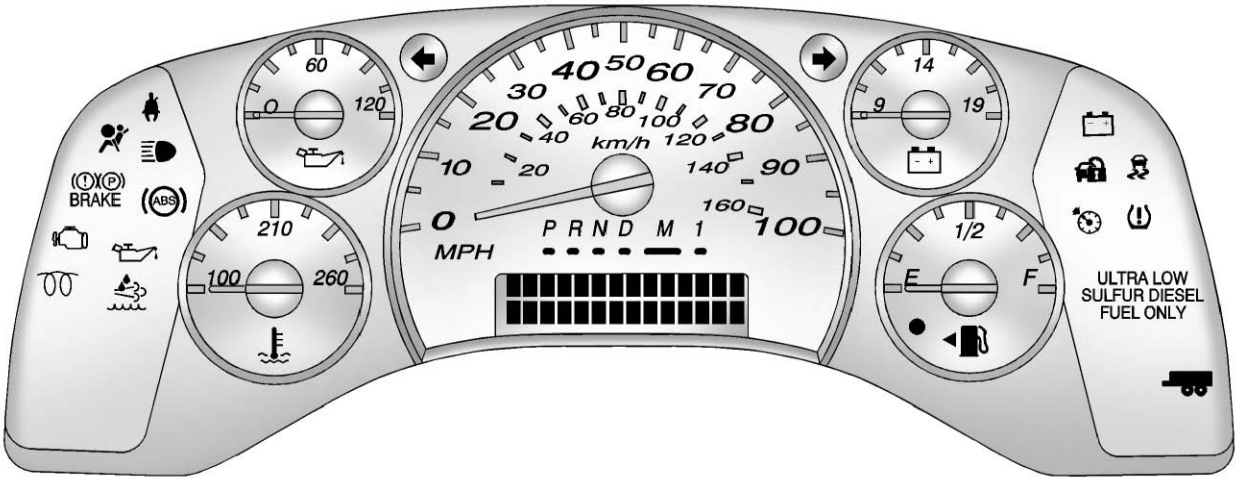
Vehicle Personalization 5-14

Warning Lights, Gauges, and Indicators

Instrument Cluster



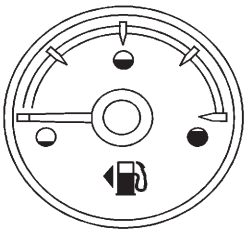
English Pickup Shown, Metric Similar



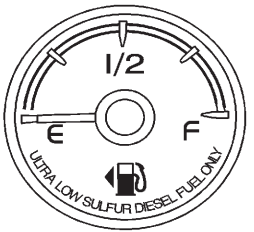
English Van Shown, Metric Similar

See the owner manual for telltales and gauges not listed in supplement.

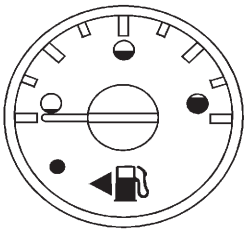
Fuel Gauge



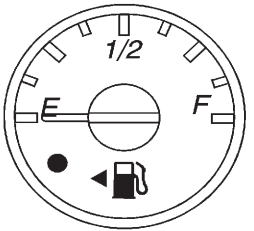
Metric Pickup Models



English Pickup Models



Metric Van Models



English Van Models

When the ignition is on, the fuel gauge shows approximately how much fuel the vehicle has left in the tank. The gauge will first indicate E (empty) before the vehicle is out of fuel, but the vehicle's fuel tank should be filled soon.

An arrow on the fuel gauge indicates the side of the vehicle the fuel door is on.

Listed are four situations customers may experience with the fuel gauge:

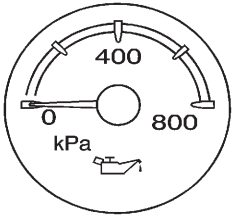
- At the gas station, the fuel pump shuts off before the gauge reads F (full).
- It takes a little more or less fuel to fill up than the fuel gauge indicated. For example, the gauge may have indicated the tank was half full, but it actually took a little more or less than half the tank's capacity to fill the tank.
- The gauge moves a little while turning a corner or speeding up.
- The gauge does not go back to E (empty) when the ignition is turned off.

None of these indicate a problem with the fuel gauge.

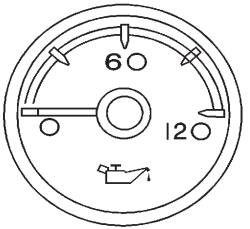
For information on how to fill the fuel tank, see *Filling the Tank on page 9-33*.

The vehicle also has a fuel cooler. To clean, powerwash the bottom of the vehicle.

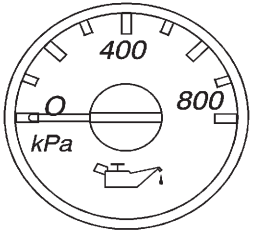
Engine Oil Pressure Gauge



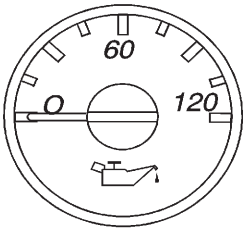
Metric Pickup Models



English Pickup Models



Metric Van Models



English Van Models

⚠ WARNING

Do not keep driving if the oil pressure is low. The engine can become so hot that it catches fire. Someone could be burned. Check the oil as soon as possible and have the vehicle serviced.

Notice: **Lack of proper engine oil maintenance can damage the engine. The repairs would not be covered by the vehicle warranty. Always follow the maintenance schedule for changing engine oil.**

The engine oil pressure gauge reads in kPa (kilopascals) or psi (pounds per square inch) when the engine is running. Oil pressure may vary with engine speed, outside temperature and oil viscosity.

If readings are outside the normal operating range, the low oil pressure message may display on the Driver Information Center (DIC), or for vehicles without DIC the oil pressure light comes on. If the oil level is outside the normal operating range of 0-548 kPa (0-80 psi), check the oil level immediately. DO NOT operate the engine with the oil pressure warning light on or a ENGINE OIL LOW ADD OIL message displayed.

Malfunction Indicator Lamp

A computer system called OBD II (On-Board Diagnostics-Second Generation) monitors operation of the fuel, ignition, and emission control systems. It makes sure that emissions are at acceptable levels for the life of the vehicle, helping to produce a cleaner environment.

This light comes on when the ignition is on, but the engine is not running, as a check to show it is working. If it does not, have the vehicle serviced by your dealer.

If the check engine light comes on and stays on, while the engine is running, this indicates that there is an OBD II problem and service is required.

This light also comes on when the Diesel Exhaust Fluid (DEF) is not working. See *Diesel Exhaust Fluid on page 9-12* for more information.

Malfunctions often are indicated by the system before any problem is apparent. Heeding the light can prevent more serious damage to the vehicle. This system assists the service technician in correctly diagnosing any malfunction.

Notice: **If the vehicle is continually driven with this light on, after a while, the emission controls might not work as well, the vehicle fuel economy might not be as good, and the engine might not run as smoothly. This could lead to costly repairs that might not be covered by the vehicle warranty.**

Notice: **Modifications made to the engine, transmission, exhaust, intake, or fuel system of the vehicle or the replacement of the original tires with other than those of the same Tire Performance Criteria (TPC) can affect the vehicle's emission controls and can cause this light to come on. Modifications to these systems could lead to costly repairs not covered by the vehicle warranty. This could also result in a failure to pass a required Emission Inspection/Maintenance test. See *Accessories and Modifications on page 10-1*.**

This light comes on during a malfunction in one of two ways:

Light Flashing: A misfire condition has been detected. A misfire increases vehicle emissions and could damage the emission control system on the vehicle. Diagnosis and service might be required.

The following can prevent more serious damage to the vehicle:

- Reduce vehicle speed.
- Avoid hard accelerations.
- Avoid steep uphill grades.
- If towing a trailer, reduce the amount of cargo being hauled as soon as it is possible.

If the light continues to flash, when it is safe to do so, stop the vehicle. Find a safe place to park the vehicle. Turn the vehicle off, wait at least 10 seconds, and restart the engine. If the light is still flashing, follow the previous steps and see your dealer for service as soon as possible.

Light On Steady: An emission control system malfunction has been detected on the vehicle. Diagnosis and service might be required.

An emission system malfunction might be corrected by doing the following:

- If the vehicle has been driven through a deep puddle of water, the vehicle's electrical system might be wet. The condition is usually corrected when the electrical system dries out. A few driving trips should turn the light off.
- Make sure to fuel the vehicle with quality fuel. Poor fuel quality causes the engine not to run as efficiently as designed and may cause: stalling after start-up, stalling when the vehicle is changed into gear, misfiring, hesitation on acceleration, or stumbling on acceleration. These conditions might go away once the engine is warmed up.

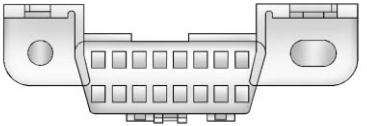
  If one or more of these conditions occurs, change the fuel brand used. It will require at least one full tank of the proper fuel to turn the light off.

  See *Fuel for Diesel Engines on page 9-16*.

If none of the above have made the light turn off, your dealer can check the vehicle. The dealer has the proper test equipment and diagnostic tools to fix any mechanical or electrical problems that might have developed.

Emissions Inspection and Maintenance Programs

Some state/provincial and local governments may have programs to inspect the on-vehicle emission control equipment For the inspection, the emission system test equipment is connected to the vehicle's Data Link Connector (DLC).



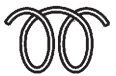
The DLC is under the instrument panel to the left of the steering wheel. See your dealer if assistance is needed.

The vehicle may not pass inspection if:

- the check engine light is on with the engine running, or if the light does not come on when the ignition is turned to ON/RUN while the engine is off.
- the critical emission control systems have not been completely diagnosed by the system. This can happen if the battery has recently been replaced or if the battery has run down. The diagnostic system evaluates critical emission control systems during

normal driving. This can take several days of routine driving. If this has been done and the vehicle still does not pass the inspection , your dealer can prepare the vehicle for inspection.

Wait-to-Start Light



The wait to start light shows that the engine is functioning properly and indicates when the engine can be started.

The fast warm-up glow plug system makes the wait to start light stay on for a shorter amount of time than most diesel engines.

For more information, see *Starting the Diesel Engine on page 9-1*.

Diesel Exhaust Fluid (DEF) Warning Light

This light, a Driver Information Center (DIC) Message, and a chime come on when there is an issue with the Diesel Exhaust Fluid.

See *Diesel Exhaust Fluid Messages on page 5-11* for information on the specific message displaying with the light.

If the DEF fluid level has not been corrected, the light will continue to flash when the vehicle is started or after a fuel refill. The vehicle's speed may also be limited.

Also see *Diesel Exhaust Fluid on page 9-12* for more information.

Information Displays

Driver Information Center (DIC)

The Driver Information Center (DIC) is located on the instrument panel above the steering wheel. The DIC comes on when the ignition is on.

A Duramax Diesel vehicle may have the following additional DIC menu items.

FUEL FILTER LIFE REMAINING

To access this display, the vehicle must be in P (Park). If your vehicle has DIC buttons, press the vehicle information button until FUEL FILTER LIFE REMAINING displays. If your vehicle does not have DIC buttons, press the trip stem until FUEL FILTER LIFE REMAINING displays. This display shows an estimate of the fuel filter's remaining useful life. If you see 90% FUEL FILTER LIFE REMAINING on the display, it means 90% of the current fuel filter life remains. The fuel filter life system will alert you to change your fuel filter on a schedule consistent with your driving conditions.

When the remaining fuel filter life is low, the CHANGE FUEL FILTER message will appear on the display. You should change your fuel filter as soon as you can.

FUEL FILTER LIFE RESET

You must reset the FUEL FILTER LIFE REMAINING display after each fuel filter change. It will not reset itself. Also, be careful not to reset the FUEL FILTER LIFE REMAINING display at any time other than when the fuel filter has just been changed because it cannot be reset accurately until the next fuel filter change. The fuel filter life will change to 100% when the system has been reset. To reset the system, press and hold the set/reset button, or the trip stem if there are no DIC buttons, for two seconds while FUEL FILTER LIFE REMAINING is displayed on the DIC.

Vehicle Messages

The Driver Information Center (DIC) will display warning messages if a problem is detected. Pressing the select button or the set/reset button for vehicle with DIC buttons, or the trip odometer reset stem for vehicles without DIC buttons, will acknowledge some current warning or service messages. Other messages are more urgent and cannot be cleared from the display until the issue is corrected.

The following are some additional messages that the Duramax Diesel vehicle can display.

Engine Cooling System Messages

COOLANT LEVEL LOW ADD COOLANT

Notice: **Engine damage from running your engine without coolant is not covered by your warranty. See "Overheated Engine Protection Operating Mode" in the Index of your owner's manual for information on driving to a safe place in an emergency.**

If your vehicle has a low coolant level sensor, this message will appear on the DIC if the engine coolant level is low. Adding coolant to the coolant recovery tank will clear the message. See "Engine Coolant" in the owner manual.

Engine Oil Messages

ENGINE OIL LOW ADD OIL

If your vehicle has an oil level sensor, this message displays if the oil level in the vehicle is low. Check the oil level and correct it as necessary. You may need to let the vehicle cool or warm up and cycle the ignition to be sure this message clears.

This message clears itself after 10 seconds, until the next ignition cycle. See *Engine Oil on page 10-7* for additional information.

Engine Power Messages

ENGINE POWER IS REDUCED

A computer monitors the operation of the electric accelerator. If the ENGINE POWER IS REDUCED message comes on while driving, there will be a reduction in performance and acceleration. You should take the vehicle in for service.

Fuel System Messages

CHANGE FUEL FILTER

This message will appear on the DIC for 10 seconds when a fuel filter change is required. See *Fuel Filter Replacement on page 9-31* for more information.

WATER IN FUEL SERVICE REQUIRED

This message will come on to warn you if there is water in the diesel fuel system. For more information on how this message works, see *Water in Fuel on page 9-26*.

Diesel Exhaust Fluid Messages

EXHAUST FLUID EMPTY REFILL NOW

This message will be displayed when the exhaust fluid is empty. This message may be accompanied by other messages that provide more information.

EXHAUST FLUID LOW SPEED LIMITED SOON

When the exhaust fluid range is less than 120 km (75 miles) this message will be displayed.

EXHAUST FLUID RANGE: XXX

When the exhaust fluid is getting low, the range will be displayed in either kilometers or miles. It is normal for the EXHAUST FLUID RANGE to vary based on vehicle and environmental driving conditions.

EXHAUST FLUID QUALITY POOR SEE OWNERS MANUAL NOW

This message displays when the exhaust fluid is of poor quality. This message may be accompanied by other messages that provide more information.

Diesel Particulate Filter Messages

CLEANING EXHAUST FILTER KEEP DRIVING UNTIL MESSAGE IS CLEARED

This message will appear on the DIC when an exhaust particulate filter cleaning is required. To clean the filter, drive the vehicle above 50 km/h (30 mph) until the warning message goes off. This will take about 30 minutes.

If the filter is not cleaned, the malfunction indicator lamp will come on and the REDUCED ENGINE POWER message will be displayed. Vehicle performance will be limited. See *Diesel Particulate Filter (Exhaust Filter) on page 9-10* for more information.

Service Vehicle Messages

SERVICE EXHAUST FLUID SYSTEM SEE OWNERS MANUAL NOW

This message displays when the exhaust fluid system needs service. This message may be accompanied by other messages that provide more information.

Starting the Vehicle Messages

ELEVATED IDLE OFF

If your vehicle does not have DIC buttons, this message will appear when the elevated idle/exhaust restrictor feature has been turned off. This feature can be turned on or off by pressing the pedals. For more information on the elevated idle/exhaust restrictor feature, see “Elevated Idle” under *Starting the Diesel Engine on page 9-1*.

If your vehicle has DIC buttons, this message will not be displayed. The Elevated Idle can be turned on or off using the customization menus. Press the customization button until ELEVATED IDLE appears on the DIC display. Press the set/reset button once to access the settings for this feature. Then press the customization button to scroll through the following settings: OFF, ON or NO CHANGE. Choose one of the available settings and press the set/reset button while it is displayed on the DIC to select it.

ELEVATED IDLE ON

If your vehicle does not have DIC buttons, this message will appear when the elevated idle/exhaust restrictor feature has been turned on. This feature can be turned on or off by pressing the pedals. For more information on the elevated idle/exhaust restrictor feature, see "Elevated Idle" under *Starting the Diesel Engine on page 9-1*.

If your vehicle has DIC buttons, this message will not be displayed. The Elevated Idle can be turned on or off using the customization menus. Press the customization button until ELEVATED IDLE appears on the DIC display. Press the set/reset button once to access the settings for this feature. Then press the customization button to scroll through the following settings: OFF, ON or NO CHANGE. Choose one of the available settings and press the set/reset button while it is displayed on the DIC to select it.

FAST IDLE ON

If your vehicle has this feature, this message displays when the fast idle feature is on. See "Fast Idle Control" under *Starting the Diesel Engine on page 9-1*.

Transmission Messages

SHIFT INHIBITED SELECT N TO RESET (Pickup Models)

If the transmission is unable to shift into a selected gear, this message will appear on the DIC. The electronic shift position indicator on the instrument panel cluster may blink when this occurs. To make the vehicle shift to the requested gear, you may have to shift back to P (Park) or N (Neutral) and re-select the desired gear.

Vehicle Speed Messages

89 KM/H (55 MPH) MAX SPEED UPON RESTART

This message will be displayed along with other messages. These messages include EXHAUST FLUID EMPTY REFILL NOW, EXHAUST FLUID QUALITY POOR, or SERVICE EXHAUST FLUID SYSTEM. The vehicle speed will be limited to 89 KM/H (55 MPH) at the next restart.

7 KM/H (4 MPH) MAX SPEED NEXT FUEL FILL

This message will be displayed along with other messages. These messages include EXHAUST FLUID EMPTY REFILL NOW, EXHAUST FLUID QUALITY POOR, or SERVICE EXHAUST FLUID SYSTEM. The vehicle speed will be limited to 7 KM/H (4 MPH) at the next fuel fill.

SPEED LIMITED TO 89 KM/H (55 MPH)

This message will be displayed along with other messages. These messages include EXHAUST FLUID EMPTY REFILL NOW, EXHAUST FLUID QUALITY POOR, or SERVICE EXHAUST FLUID SYSTEM. When this message is displayed, the vehicle speed is being limited to 89 KM/H (55 MPH).

SPEED LIMITED TO 7 KM/H (4 MPH)

This message will be displayed along with other messages. These messages include EXHAUST FLUID EMPTY REFILL NOW, EXHAUST FLUID QUALITY POOR, or SERVICE EXHAUST FLUID SYSTEM. When this message is displayed, the vehicle speed is being limited to 7 KM/H (4 MPH).

Vehicle Personalization

Your Duramax Diesel vehicle may have additional customizable features for Power Take-Off (PTO). See *Power Take-Off (PTO) on page 9-39* for more information.

Entering the Feature Settings Menu

1. Turn the ignition on and place the vehicle in P (Park).

   To avoid excessive drain on the battery, it is recommended that the headlamps are turned off.

2. Press the customization button to scroll through the available customizable options.

Feature Settings Menu Items

PTO STANDBY SPEED

This feature allows you to select the PTO standby speed.

Press the customization button until the PTO STANDBY SPEED screen appears on the DIC display. Press the set/reset button once to access the settings for this feature. Then press the customization button to scroll through the following choices:

- 800 RPM
- 900 RPM
- 1000 RPM
- 1100 RPM
- 1200 RPM
- 1300 RPM
- 1400 RPM
- 1500 RPM
- NO CHANGE

To select a setting, press the set/reset button while the desired setting is displayed on the DIC.

PTO SET 1 SPEED

This feature allows you to select the PTO 1 set speed.

Press the customization button until the PTO SET 1 SPEED screen appears on the DIC display. Press the set/reset button once to access the settings for this feature. Then press the customization button to scroll through the following choices:

- 1000 RPM
- 1200 RPM
- 1400 RPM
- 1600 RPM
- 1800 RPM
- 2000 RPM
- 2200 RPM
- 2400 RPM
- NO CHANGE

To select a setting, press the set/reset button while the desired setting is displayed on the DIC.

PTO SET 2 SPEED

This feature allows you to select the PTO 2 set speed.

Press the customization button until the PTO SET 2 SPEED screen appears on the DIC display. Press the set/reset button once to access the settings for this feature. Then press the customization button to scroll through the following choices:

- 1800 RPM
- 2000 RPM
- 2200 RPM
- 2400 RPM
- 2600 RPM
- 2800 RPM
- 3000 RPM
- 3200 RPM
- NO CHANGE

To select a setting, press the set/reset button while the desired setting is displayed on the DIC.

PTO TAP STEP

This feature allows you to select the PTO tap step.

Press the customization button until the PTO TAP STEP screen appears on the DIC display. Press the set/reset button once to access the settings for this feature. Then press the customization button to scroll through the following choices:

- 25 RPM
- 75 RPM
- 100 RPM
- 150 RPM
- 200 RPM
- 250 RPM
- 350 RPM
- NO CHANGE

To select a setting, press the set/reset button while the desired setting is displayed on the DIC.

PTO SHUTDOWN TIME

This feature allows you to select the PTO shutdown time.

Press the customization button until the PTO SHUTDOWN TIME screen appears on the DIC display. Press the set/reset button once to access the settings for this feature. Then press the customization button to scroll through the following choices:

- OFF
- 20 MINUTES
- 35 MINUTES
- 50 MINUTES
- 65 MINUTES
- 80 MINUTES
- 95 MINUTES
- 110 MINUTES
- NO CHANGE

To select a setting, press the set/reset button while the desired setting is displayed on the DIC.

Driving and Operating

Starting and Operating
Starting the Diesel Engine 9-1
Winter Cover 9-5
Engine Heater 9-9
Fuel Operated Heater (FOH) (Van Models Only) 9-10
Parking Over Things That Burn 9-10

Engine Exhaust
Diesel Particulate Filter (Exhaust Filter) 9-10
Diesel Exhaust Fluid 9-12

Brakes
Exhaust Brake (Pickup Models only) 9-15

Fuel
Fuel for Diesel Engines 9-16
What Fuel to Use in The U.S. 9-17
What Fuel to Use in Canada and Mexico 9-22
Cold Weather Operation 9-25
Water in Fuel 9-26
Running Out of Fuel 9-30
Fuel Filter Replacement 9-31
Filling the Tank 9-33
Filling a Portable Fuel Container 9-34

Towing
Trailer Towing 9-35

Conversions and Add-Ons
Power Take-Off (PTO) 9-39

Starting and Operating

Starting the Diesel Engine

The diesel engine starts differently than a gasoline engine. The vehicle will only start in the P (Park) or the N (Neutral) position.

Move the shift lever to P (Park) or N (Neutral). To restart the engine when the vehicle is already moving, use N (Neutral) only.

Notice: **Do not try to shift to P (Park) if the vehicle is moving. If you do, you could damage the transmission. Shift to P (Park) only when the vehicle is stopped.**

Starting the Engine

1. Turn the ignition key to ON/RUN.

   Observe the wait to start light. See *Wait-to-Start Light on page 5-9*. This light may not come on if the engine is warm.

2. As soon as the wait to start light goes off, immediately turn the ignition key to START. When the engine starts, let go of the key.

   The engine has a fast warm-up glow plug system. The wait to start light will illuminate for a much shorter time than most diesel engines, due to the rapid heating of the glow plug system.

Notice: **If the wait-to-start light stays on after starting the vehicle, the vehicle may not run properly. Have the vehicle serviced right away.**

3. If the engine does not start after 15 seconds of cranking, turn the ignition switch to LOCK/OFF. Wait one minute for the starter to cool, then try the same steps again.

If you are trying to start the engine after you have run out of fuel, follow the steps in *Running Out of Fuel on page 9-30*.

When the engine is cold, let it run for a few minutes before you move the vehicle. This lets oil pressure build up. The engine will sound louder when it's cold.

Notice: **If you are not in an idling vehicle and the engine overheats, you would not be there to see the overheated engine indication. This could damage the vehicle. Do not let the engine run when you are not in the vehicle.**

Cold Weather Starting (Diesel Engine)

The following tips will help with cold weather starting.

Use the recommended engine oil when the outside temperature drops below freezing. See *Engine Oil on page 10-7*. When the outside temperature drops below –18°C (0° F), use of the engine coolant heater is recommended.

If you experience longer cranking times, notice an unusual amount of exhaust smoke or are at higher elevations (over 2 135 m or 7,000 ft.), you may use the engine coolant heater. See *Engine Heater on page 9-9*.

See *Fuel for Diesel Engines on page 9-16* for information on what fuel to use in cold weather.

If the Diesel Engine Will Not Start

If you have run out of fuel, see *Running Out of Fuel on page 9-30*.

If the vehicle is not out of fuel, and the engine will not start, do this:

Turn the ignition key to ON/RUN. Immediately after the wait to start light goes off, turn the ignition key to START.

If the light does not go off, wait a few seconds, then try starting the engine again. See your dealer as soon as you can for a starting system check.

If the light comes on and then goes off and you know the batteries are charged, but the engine still will not start, the vehicle needs service.

If the light does not come on when the engine is cold, the vehicle needs service.

If the batteries don't have enough charge to start the engine, see “Battery” in the Index of the vehicle owner manual.

Be sure you have the right oil for the engine, and that you have changed the oil at the proper times. If you use the wrong oil, the engine may be harder to start.

Be sure you are using the proper fuel for existing weather conditions. See *Fuel for Diesel Engines on page 9-16*.

If the engine starts, runs a short time, then stops, the vehicle needs service.

⚠ WARNING

Do not use gasoline or starting aids, such as ether, in the air intake. They could damage the engine. There could also be a fire, which could cause serious personal injury.

Elevated Idle

The engine has a cold temperature high idle feature which elevates the engine idle speed from base idle to 1050 rpm for pickup models or 1200 rpm for van models when outside temperatures are below 0°C (32°F), and the engine coolant temperature is below 65°C (150°F). This feature enhances heater performance by raising the engine coolant temperature faster.

This feature can be turned on or off using the DIC buttons. If the vehicle is not equipped with DIC buttons, do the following to turn this feature on or off:

1. Turn the ignition to ON/RUN, with the vehicle off.
2. Press the accelerator pedal to the floor and hold while quickly pressing the brake pedal three times in less than eight seconds.
3. Release the accelerator pedal and start the engine.

When the engine is started, it will slowly ramp up to the high idle speed after a delay of a few seconds up to approximately two minutes. For this method to work properly there must be no throttle or brake pedal faults.

The engine idle speed will return to normal once the following conditions are met:

- Once engine coolant temperature reaches 65°C (150°F).
- Air intake temperature reaches 0°C (32°F).

The high idle speed will be temporarily interrupted and the engine speed will return to normal if any of the following conditions occur:

- The brake pedal is applied.
- The accelerator pedal is pressed.
- The transmission is shifted out of P (Park) or N (Neutral).
- Vehicle speed is detected.

Once these inputs are removed, the engine idle speed will slowly ramp back up to high idle after the normal delay, if the conditions for engine coolant temperature and air intake temperature are still met.

Fast Idle Control

The vehicle may have this system which can be used to increase the engine idle speed.

Fast Idle control will be enabled when the following conditions are met:

- The park brake is set.
- The transmission is in P (Park) or N (Neutral).
- The vehicle speed is about 0 km/h (0 mph).
- The cruise control is in the On position. See “Cruise Control” in the Index of the vehicle owner manual.
- The cruise control Set switch is pressed and released for Preset Fast Idle Speed (1200 rpm).

Fast Idle control will be disabled when one or more of the following conditions occur:

- The cruise control is in the Off position.
- The cruise control Set switch is pressed and released. See “Cruise Control” in the Index of the vehicle owner manual.
- The cruise control Cancel switch is pressed.
- The brake pedal is pressed.
- The transmission is shifted out of P (Park) or N (Neutral).
- The park brake is released.
- The vehicle speed is not 0 km/h (0 mph).

When Fast Idle is active, a FAST IDLE ON message will be displayed in Driver Information Center (DIC). See *Starting the Vehicle Messages on page 5-12*.

Winter Cover

If the vehicle includes a winter cover, it can be used to enhance heater performance in extremely cold conditions below −18°C (0°F). The winter cover installs over the grille and restricts air flow to the engine compartment.

For diesel powered vehicles that did not come with a winter cover, a GM winter cover can be purchased as an accessory. See your dealer for additional information.

Usage Guidelines

The winter cover should only be used while operating the vehicle in extremely cold temperatures or in heavy snow for extended periods of time. In these temperatures, the vehicle does not need a large amount of air to properly cool the engine. When more airflow is required to cool the vehicle, the winter cover should not be used.

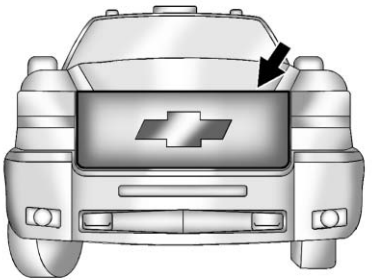
The following usage guidelines will allow adequate airflow for proper radiator and air cooler performance:

- Do not use the winter cover if towing a trailer. The added power needed to tow a trailer requires the radiator grille to have full airflow under all conditions. The vehicle may overheat if the cover is used while towing a trailer.
- Do not modify the cover. The winter cover does not cover some sections of the front of the vehicle because these openings are needed to provide enough airflow to the radiator grille and air cooler in extremely cold temperatures.
- When the winter cover is used, the temperature sensor found on the inside rearview mirror will not function properly. The temperature that is shown will be incorrect.
- Keep the underside of the winter cover as clean as possible at all times. Remove monthly or as necessary and clean away dust and debris.
- Use only a mild soap to clean the winter cover. Do not use harsh soap, strong detergents or vinyl protectant/sealant type products as they may destroy the special finish of the winter cover. Allow the winter cover to dry completely before reinstalling on the vehicle.

Installation Instructions

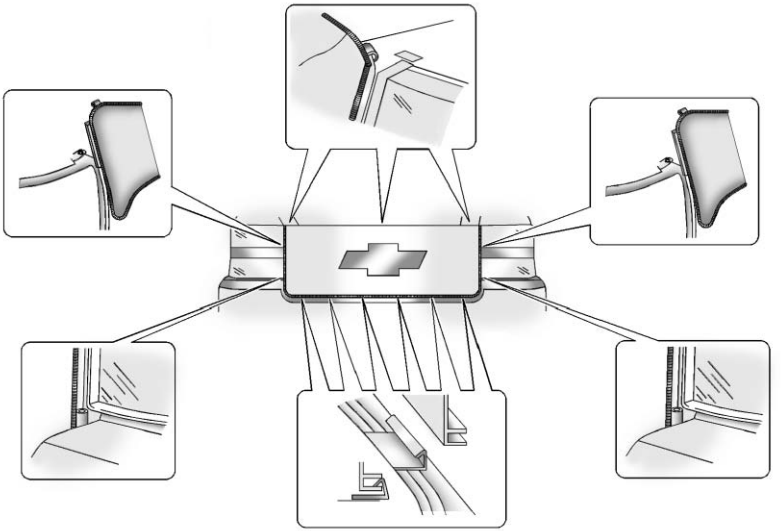
When you first try to fit the cover it may appear to be undersized. This is due to the nature of the special vinyl, which will stretch during installation to ensure a tight fit. For this reason, the initial installation of the cover is best performed when the winter cover is warm.

Installation (Chevrolet Pickup)



Open the hood.

A. Slide the channels of the cover down the back edge of the grille on both sides.



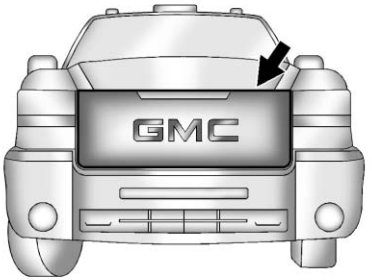
B. Hook J-clips to the bottom of the grille.

C. Hook J-clips on to the top edge of the grille by the engine compartment.

D. Hook J-clips to the side edge of the grille.

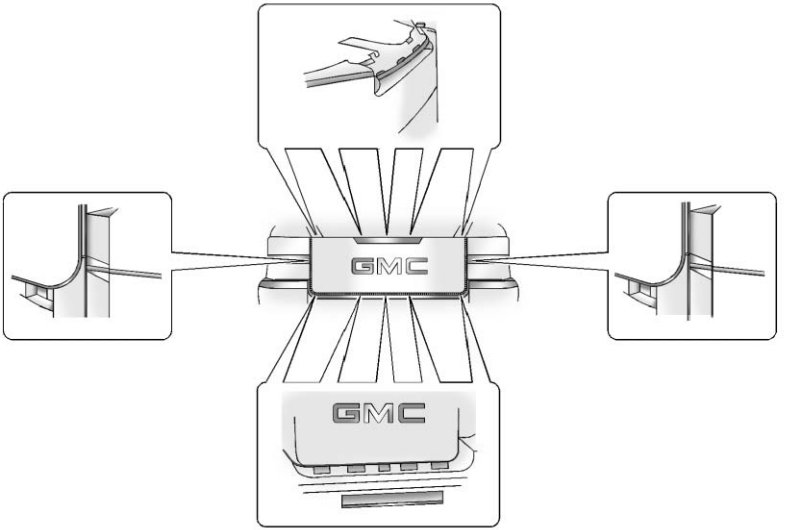
E. To remove the winter cover, reverse the steps listed previously.

Installation (GMC Pickup)



Open the hood.

A. Slide the channels of the cover down the back edge of the grille on both sides.



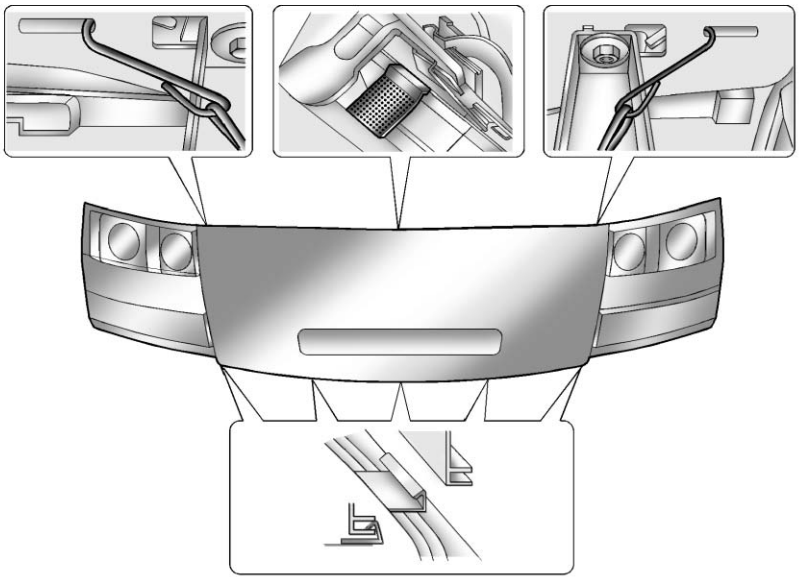
B. Insert pockets between the grille and the bumper.

C. Hook J-clips on to the top edge of the grille by the engine compartment.

D. To remove the winter cover, reverse the steps listed previously.

Installation (Van Models)

Open the hood and secure it with the prop rod.



A. Hook the 5 J-clips on to the bottom edge of the grille.

B. Hook the top center J-clip by the hood latch.

C. Attach the metal hooks, one each at the top corners.

D. To remove the winter cover, reverse the steps listed previously.

Engine Heater

The engine coolant heater can provide easier starting and better fuel economy during engine warm-up in cold weather conditions at or below −18°C (0°F). Vehicles with an engine coolant heater should be plugged in at least four hours before starting.

To Use the Engine Heater

1. Turn off the engine.
2. Open the hood and unwrap the electrical cord. The cord is located in the engine compartment, on the passenger's side of the vehicle, near the right side auxiliary battery.
3. Plug it into a normal, grounded 110-volt AC outlet.

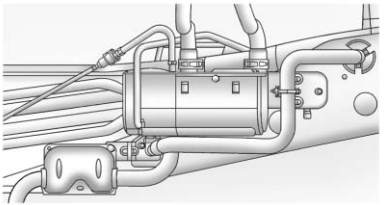
⚠ WARNING

Plugging the cord into an ungrounded outlet could cause an electrical shock. Also, the wrong kind of extension cord could overheat and cause a fire. You could be seriously injured. Plug the cord into a properly grounded three-prong 110-volt AC outlet. If the cord will not reach, use a heavy-duty three-prong extension cord rated for at least 15 amps.

4. Before starting the engine, be sure to unplug and store the cord as it was before to keep it away from moving engine parts, and prevent damage.

The length of time the heater should remain plugged in depends on the outside temperature. You may wish to use the coolant heater to improve ease of starting at temperatures between −18°C (0°F) and −29°C (−20°F). Keep the coolant heater plugged in for a minimum of four hours. At temperatures below −29°C (−20°F), the coolant heater should remain plugged in for at least eight hours. It will not harm either the coolant heater or the vehicle to leave the coolant heater plugged in longer than the times stated. Be sure to remove and store the cord before starting the engine. See *Fuel for Diesel Engines on page 9-16* for information on what fuel to use in cold weather.

Fuel Operated Heater (FOH) (Van Models Only)



If the vehicle includes an FOH, it will enhance heater performance and will reduce the amount of time it takes to warm the inside of the vehicle in cold conditions below or equal to 4°C (39°F). The FOH is installed on the frame rail on the driver side of the vehicle and uses diesel fuel to heat the engine coolant, which warms up the passenger cabin air.

The FOH will turn on if all of the following conditions exist:

- Outside air temperature is below or equal to 4°C (39° F).
- Fuel level is greater or equal to 12.5 percent of the total fuel tank volume.
- The engine is running.
- Coolant temperature is less than 75°C (167° F).

Parking Over Things That Burn

⚠ WARNING

Things that can burn could touch hot exhaust parts under the vehicle and ignite. Do not park over papers, leaves, dry grass, or other things that can burn.

Engine Exhaust

Diesel Particulate Filter (Exhaust Filter)

The vehicle has a Diesel Particulate Filter (DPF) as part of the exhaust system to reduce vehicle emissions. The DPF requires a unique exhaust tailpipe with an exhaust cooler. The exhaust cooler mixes air with the exhaust to lower the temperature before it leaves the tailpipe.

The DPF, the tailpipe, or other exhaust system components must not be altered. Inspect regularly and clean any mud or dirt from the exhaust cooler, especially where the exhaust cooler connects to the tailpipe and the openings where fresh air enters the cooler. See “Exhaust System Inspection” under *Scheduled Maintenance on page 11-2*.

The DPF will clean itself as part of normal operation. Several factors including fuel consumed, hours of engine operation and miles driven are monitored by the Engine Control Module (ECM). The self-cleaning occurs approximately once per tank of fuel.

Notice: **Permanent damage can occur to the DPF or related components if the required Ultra Low Sulfur Diesel (15 ppm sulfur maximum) or low ash CJ-4 engine oil is not used. This damage would not be covered by the vehicle warranty.**

Under certain driving conditions, such as stop and go traffic, the filter cannot clean itself. The CLEANING EXHAUST FILTER KEEP DRIVING UNTIL MESSAGE IS CLEARED message comes on when the DPF is dirty and needs to perform a self-cleaning.

For the filter to clean itself, the vehicle must be driven above 50 km/h (30 mph) until the CLEANING EXHAUST FILTER KEEP DRIVING UNTIL MESSAGE IS CLEARED message goes off. This will take about 30 minutes.

⚠ WARNING

During DPF self cleaning or during extended idling in P (Park), the exhaust system and exhaust gases are very hot. Things that burn could touch hot exhaust parts under the vehicle and ignite. You or others could be burned. Do not park, or idle for an extended period of time, near or over papers, leaves, dry grass, or other things that can burn. Keep the exhaust area clear of material that could ignite or burn. See *Parking Over Things That Burn on page 9-10* for more information.

Notice: **Extended idle should be avoided because the DPF system is not capable of self cleaning at idle. During extended idle operation, monitor the instrument panel telltale lights and Driver Information Center for messages and take appropriate indicated action. Continued idling with the warning light/message on could cause irreversible damage to the DPF requiring repair and possible replacement that might not be covered by the vehicle warranty.**

You will also notice a change in the exhaust sound and engine idle speed. This is normal. See *Vehicle Messages on page 5-10*.

If you continue to drive with the DPF warning message on and the exhaust filter is not cleaned as required, the Malfunction Indicator Lamp and the ENGINE POWER IS REDUCED message will come on and dealer service is necessary. See *Malfunction Indicator Lamp on page 5-6* and *Engine Power Messages on page 5-11*.

Vehicles with DPF have specific fuel and engine oil requirements. See *What Fuel to Use in The U.S. on page 9-17* or *What Fuel to Use in Canada and Mexico on page 9-22* and *Engine Oil on page 10-7* for more information on those requirements.

Extended idling in P (Park) can cause exhaust parts and gases to become very hot. Keep the exhaust area clear of material that could ignite or burn. See *Parking Over Things That Burn on page 9-10* for more information.

For vehicles with Power Take-Off (PTO), monitor the instrument panel cluster for lights related to the DPF.

All engines consume some amount of engine oil. Ash is the by-product of engine oil combustion. The ash will become trapped in the DPF over the life of the vehicle. Eventually, the buildup of ash will restrict the exhaust gases and the DPF will need to be cleaned or replaced.

See *Accessories and Modifications on page 10-1* for important information if you are considering adding accessories or modifying the vehicle.

Diesel Exhaust Fluid

⚠ WARNING

Diesel Exhaust Fluid (DEF) is corrosive. Do not allow it to come in contact with your skin, eyes, or the finished surfaces of the vehicle. If exposed, it may cause skin and eye irritation. Wear skin and eye protection when handling. Inhalation may cause irritation to the upper respiratory tract. Store in a cool, well-ventilated area. For more safety information, see the label of the Diesel Exhaust Fluid container.

Diesel Exhaust Fluid (DEF) is used with diesel engines to reduce the amount of regulated emissions produced. The fluid level in the DEF tank must be maintained for the vehicle to run correctly. The capacity of the DEF tank is approximately 18.9 L (5 gal).

Locating Diesel Exhaust Fluid

DEF can be purchased at a Chevrolet or GMC dealer. It can also be purchased at authorized vehicle and truck dealerships. Additionally, some diesel truck fuelling stations or retailers may also have DEF for purchase. For vehicles with an active OnStar subscription, OnStar can help to locate a DEF retailer. For more information on locating DEF see www.afdc.energy.gov/afdc/vehicles/diesels_fluid.html. See “Customer Assistance Offices” in the owner manual for phone numbers to assist you in contacting a GM dealer. See *Recommended Fluids and Lubricants on page 11-8*.

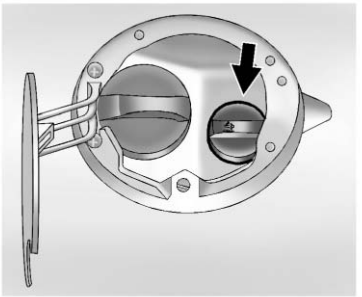
Filling the DEF Tank

Notice: **Use only exhaust fluid that is GM approved, or fluid containing the API certified or ISO 22241 label. The use of other fluids could damage the system, requiring costly repairs that will not be covered by the vehicle warranty.**

When adding DEF to an empty or very low tank, always add at least 3.78 liters (one gallon) of fluid to release the vehicle from speed limitation.

Do not over fill the DEF tank. When fluid reaches the top of the fill pipe, stop filling. Do not top off the DEF tank.

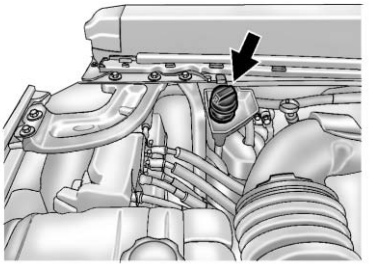
If you spill DEF on the vehicle while filling the tank, wipe the surface with a damp cloth.



DEF Fill - Vans

For vans, the DEF fill is located behind the fuel fill door. The DEF cap is blue, and diesel cap is green.

Fill tube location for chassis-cab and cutaway vans finished by an upfitter will vary. Check the upfitters manual.



DEF Fill - Pickups

For full sized pickups, the DEF fill is located under the hood, on the passenger side, at the back of the engine compartment. The DEF cap is blue.

Exhaust Fluid Low Warnings

A full DEF tank will last for several thousand kilometers (miles), depending on vehicle usage. As the exhaust fluid level drops, warnings will be displayed in the Driver Information Center (DIC). There will not be any DEF range DIC messages with more than 1600 km (1000 miles) of DEF range remaining. DIC messages will begin with approximately 1600 km (1000 miles) of range, and as the tank becomes empty, vehicle speed limitation will result.

To avoid vehicle speed limitations, the DEF tank should be refilled at the first opportunity after a low warning indication. If DEF is added before the EXHAUST FLUID EMPTY message appears, it may take several km/miles for the DIC message to update.

If the vehicle speed has been limited and DEF has been added, it may take up to 30 seconds after engine start with the vehicle stopped for the EXHAUST FLUID EMPTY message to clear. If the vehicle is driven prior to the DIC message clearing, the vehicle speed will still be limited. If the DIC message clears while driving, the vehicle must be completely stopped to remove the speed limitation.

If DEF is added under freezing conditions, additional time may be required to remove speed limitations.

A DIC message EXHAUST FLUID RANGE: XXX will be displayed at approximately 1600 km (1000 miles) of fluid range remaining. This message will appear again at approximately 500 km (300 miles) of range remaining before the exhaust fluid tank becomes empty.

Below 500 km (300 miles) of range remaining, these messages will appear every time the vehicle is started.

If these warnings are ignored and the DEF tank becomes empty, a DIC message 89 km/h (55 mph) MAX SPEED UPON RESTART will be displayed. There will also be a warning light and chime. The vehicle will be speed limited to 89 km/h (55 mph) at the next restart.

When adding DEF to an empty or very low tank, always add at least 3.78 liters (one gallon) of fluid to release the vehicle from speed limitation. The capacity of the DEF tank is approximately 18.9 L (5 gal).

If the vehicle continues to be driven without filling the DEF tank, it will be limited to 7 km/h (4 mph) after the second fuel fill.

See *Vehicle Messages on page 5-10*, *Diesel Exhaust Fluid (DEF) Warning Light on page 5-9* and *Recommended Fluids and Lubricants on page 11-8* for more information.

Exhaust Fluid Quality Poor

Use only exhaust fluid that is GM approved, or fluid containing the API certified or ISO 22241 label.

All DEF has an expiration date. If the system detects poor quality, contaminated or diluted DEF, the DIC will display EXHAUST FLUID QUALITY POOR. SEE OWNERS MANUAL NOW. Adding fresh DEF to the system may resolve the problem, depending on several factors. If the DIC message persists, see your dealer.

After 322 km (200 miles) of driving without correcting the problem, a DIC message 89 km/h (55 mph) MAX SPEED UPON RESTART will be displayed. There will also be a warning light and chime. The vehicle will be speed limited to 89 km/h (55 mph) at the next restart.

If the problem is not resolved after 805 km (500 miles) of operation, speed will be limited to 7 km/h (4 mph) after the next fuel fill.

Service Exhaust Fluid System

If a problem occurs with the DEF system, the DIC will display SERVICE EXHAUST FLUID SYSTEM SEE OWNERS MANUAL NOW. In some cases this message will clear itself, indicating that the DEF system was able to correct the condition. If the DIC massage persists, see your dealer.

After 322 km (200 miles) of driving without correcting the problem, a DIC message 89 km/h (55 mph) MAX SPEED UPON RESTART will be displayed. There will also be a warning light and chime. The vehicle will be speed limited to 89 km/h (55 mph) at the next restart.

If the problem is not resolved after 805 km (500 miles) of operation, speed will be limited to 7 km/h (4 mph) after the next fuel fill.

Brakes

Exhaust Brake (Pickup Models only)

The heavy duty diesel pickups have an exhaust brake to enhance the vehicle brake system, and reduce brake lining wear. A switch is used to activate the system, and is located below the climate controls in the center of the vehicle instrument panel. The switch must be pressed at each vehicle start for the system to be active. A light in the switch will come on when the Exhaust Brake is activated.

The Driver Information Center (DIC) displays the message EXHAUST BRAKE ENABLED for approximately 10 seconds, then clears.

To turn the brake off, press the exhaust brake switch a second time. The DIC displays the message EXHAUST BRAKE DISABLED for approximately 10 seconds, then clears.

Downshifts may be automatically selected to increase engine speed, which increases the effectiveness of the exhaust brake. The number of downshifts selected is determined by the length of time the vehicles brakes are applied, and the rate the vehicle is slowing. The system delivers the correct amount of braking to assist in vehicle control. The heavier the vehicle load, the more active the engine exhaust brake will be. Use of the exhaust brake will help maintain vehicle speed when used with cruise control. See Tow/Haul Mode in the vehicle owner manual.

Automatic downshifts will not occur if the vehicle is in Range Selection Mode. See Manual Mode in the vehicle owner manual.

The exhaust brake only activates when the transmission torque converter is locked. This can vary based on vehicle speed, gear and load. The exhaust brake will be more active when in Tow/Haul Mode.

Fuel

Fuel for Diesel Engines

Some states and provinces have restrictions on the purchase of diesel fuel for light-duty vehicles and require you to buy permits or pay special taxes. Some of these restrictions apply only to residents, and others apply to both residents and visitors. These restrictions can change. To learn the current restrictions in any state or province, contact your auto club, the police, or other officials.

Notice: **Diesel fuel or fuel additives not recommended in this manual could damage the fuel system, fuel-operated heater (FOH) (Van models only), and engine. Your warranty would not cover this damage. And:**

- **Diesel fuel that has been mixed with engine oil or automatic transmission fluid could damage the engine and emission controls.**

- **We do not test aftermarket diesel fuel additives. Some additives, particularly those which contain alcohol or water emulsifiers, could damage the fuel system. If you believe that unique circumstances call for a fuel additive to be used, consult your dealer for advice.**
- **If you ever run out of diesel fuel, it can be difficult to restart the engine. To avoid this, never let the tank get empty.**

If gasoline is ever accidentally added to the fuel tank, to avoid severe engine damage, do not run the engine until the fuel tank can be drained.

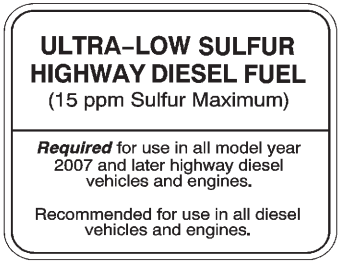
Some conditions, such as dirty fuel, may decrease fuel filter life and a change filter message may come on.

If you run out of fuel, *Running Out of Fuel on page 9-30* tells you how to restart the engine.

What Fuel to Use in The U.S.

Notice: **Use of diesel fuel other than Ultra Low Sulfur Diesel (15 ppm sulfur maximum) will cause permanent damage to the exhaust after-treatment system. This damage would not be covered by the vehicle warranty.**

The emission control system requires the use of diesel fuel with ultra low sulfur content (15 ppm or 0.0015% by weight, maximum). Look for the following label on the dispenser to ensure you are filling with Ultra Low Sulfur Diesel fuel.


ULTRA–LOW SULFUR
HIGHWAY DIESEL FUEL
(15 ppm Sulfur Maximum)
Required for use in all model year 2007 and later highway diesel vehicles and engines.
Recommended for use in all diesel vehicles and engines.

At a minimum, the diesel fuel you use should meet the latest version of ASTM specification D 975 (Grades No. 2-D or No. 1-D S15, commonly known as Ultra Low Sulfur Diesel) in the United States. If there are questions about the fuel you are using, contact your fuel supplier.

Diesel Fuel Grades

For best results use No. 2-D diesel fuel year-round (above and below freezing conditions) as oil companies blend No. 2-D fuel to address climate differences. No. 1-D diesel fuel can be used in very cold temperatures (when it stays below −18°C or 0°F); however, it will produce a power and fuel economy loss. Avoid the use of No. 1-D diesel fuel in warm or hot climates. It can result in stalling, poor starting when the engine is hot, and could damage the fuel injection system.

Premium Diesel Fuel

Diesel fuel corresponding to the Engine Manufacturers Association (EMA) Recommended Guideline on Premium Diesel Fuel (FQP-1A) could provide better starting, less noise, and better vehicle performance, but its use is not required.

Biodiesel

What is biodiesel?

Biodiesel is a fuel produced from vegetable oils or animal fats that have been chemically modified to reduce the possibility of damage to the fuel system and engine.

Notice: **Raw vegetable oil or other unmodified bio-oils or fats are not biodiesel and must not be used in your vehicle as they could damage the fuel system and engine.**

What not to use

Do not use home-made biodiesel in your vehicle since its quality cannot be verified by approved scientific methods. Home test kits are not approved scientific methods.

Notice: **Any damage caused by raw, unmodified, or home-made biodiesel would not be covered by the vehicle warranty.**

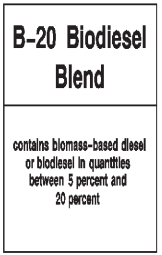
Biodiesel blends

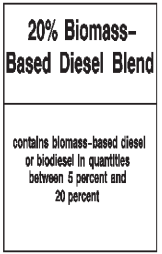
It is acceptable to use diesel fuel containing up to 20% biodiesel (B20). The diesel fuel portion of the blend must meet the same specification, ASTM D975 (Grades No. 2-D or No. 1-D S15 commonly known as Ultra Low Sulfur Diesel), as other fuels used in your vehicle, and the biodiesel used for making this fuel must meet the latest version of ASTM specification D6751.

- Pump labeling — Retail pumps dispensing blends containing up to 5% biodiesel (B5) are not required to be labeled with the concentration of biodiesel. Blends up to B5 must meet ASTM D975 (Grades No. 2-D or No. 1-D S15 commonly known as Ultra Low Sulfur Diesel).

Notice: **Do not use blends containing more than 20% biodiesel. Any engine, fuel system, or exhaust after-treatment system damage caused by the use of such blends would not be covered by the vehicle warranty.**

Pumps dispensing more than 5% and up to 20% biodiesel are required to be labeled with the concentration of biodiesel. When refueling with a biodiesel blend above B5, ensure one of the following two labels appears on the dispenser:




20% Biomass-Based Diesel Blend
contains biomass-based diesel or biodiesel in quantities between 5 percent and 20 percent

- Biodiesel quality — Blends containing more than 5% and up to 20% biodiesel must meet the latest version of ASTM specification D7467 (Biodiesel blend, B6 - B20). Biodiesel is an emerging product, and its quality can vary widely. To reduce the risk of poor quality fuel, we recommend that biodiesel users purchase biodiesel blends from a BQ-9000 certified marketer. A listing of certified marketers can be found at www.bq-9000.org. If there are questions about the biodiesel-containing fuels you are using, contact your fuel supplier.

Notice: **Certain driving patterns are not compatible with biodiesel use. It is the operator's responsibility to ensure that biodiesel in the vehicle's tank does not lead to engine, fuel system, or exhaust after-treatment system damage.**

We neither encourage nor discourage the use of biodiesel blends for vehicles. As a renewable fuel, biodiesel provides some environmental benefits.

However, biodiesel has unique properties and needs to be handled differently than diesel fuel. Its use presents additional risks and may not be appropriate in all situations. Certain vehicle operating modes increase these risks and should be avoided. Read further to determine if your driving habits are compatible with the use of biodiesel.

- Biodiesel fuel quality degrades with time and exposure to high temperature much more quickly than conventional diesel fuel. More frequent refueling provides the best opportunity to have a supply of fresh fuel.

  Owners who have very low fuel usage or who have vehicles stored for extended periods of time should avoid the use of biodiesel. Storage at hot ambient temperatures will accelerate biodiesel degradation.

  When vehicles will be stored for extended periods of time (greater than one month), they should be run out of biodiesel to below 1/4 tank, refueled with conventional Ultra Low Sulfur Diesel fuel, and driven several miles before storage.

- Biodiesel gels sooner than conventional diesel fuel at cold temperature, and biodiesel fuel requires proper blending for winter time operation.

  Fuels improperly blended for cold temperature operation may result in restricted fuel filters and degraded vehicle performance. Your vehicle is equipped with a fuel heating system to provide a level of protection against filter plugging from gelling (waxing) of conventional diesel fuel and biodiesel blends. However, the system will not prevent all cases of plugged filters if the operating temperature is far below the temperature at which gelling or waxing of the fuel occurs (cloud point).

  Use of biodiesel blends greater than B5 (5% blend) should be avoided in cold temperatures.

- Vehicles operated for extended periods of time on conventional diesel fuel and then switched to biodiesel blends may experience premature fuel filter clogging and require more frequent fuel filter service.

  With long term use of conventional diesel fuel, gum and varnish may be deposited within the tank and fuel system. These deposits, while not problematic with the use of conventional diesel fuel, may become loosened with a sudden switch to biodiesel blends and cause fuel filter plugging.

  This vehicle is equipped with a fuel filter restriction monitoring system that will alert you if the fuel filter requires service, but it will not prevent damage caused by poor quality biodiesel.

- Use of biodiesel blends will degrade the performance of your vehicle's water separator. Biodiesel reduces the effectiveness of the vehicle's water separator, and in the event of water contamination of the fuel, increases the risk of damage to the fuel system.

Refueling

Diesel fuel can foam when you fill the tank. This can cause the automatic pump nozzle to shut off, even though the tank is not full. If this happens, wait for the foaming to stop, and then try filling the tank more slowly. See *Filling the Tank on page 9-33*.

⚠ WARNING

Heat coming from the engine can cause the fuel to expand and force the fuel out of the tank. If something ignites the fuel, a fire could start and people could be burned. To help avoid this, try filling the tank more slowly and fill the fuel tank only until the automatic nozzle shuts off. Do not try to top it off.

Accidental Refueling with Gasoline

If you accidentally refuel with gasoline, your vehicle will run very rough, will produce smoke, and will have significantly reduced power. Avoid operating the vehicle and/or operate only at low speeds and/or low accelerator positions. Siphon or pump as much of the gasoline from the tank as possible, preferably until the fuel gauge reads near E (empty). Refuel with Ultra Low Sulfur Diesel fuel. Your dealer will be able to perform this procedure. Operating your vehicle for a prolonged period of time on gasoline could result in engine or fuel system damage which would not be covered by the vehicle warranty.

What Fuel to Use in Canada and Mexico

The emission control system requires the use of diesel fuel with ultra low sulfur content (15 ppm or 0.0015% by weight, maximum).

What Fuel to Use in Canada

Notice: **Use of diesel fuel other than Ultra Low Sulfur Diesel (15 ppm sulfur maximum) will cause permanent damage to the exhaust after-treatment system. This damage would not be covered by the vehicle warranty.**

At a minimum, the diesel fuel you use should meet the latest version of specification CAN/CGSB-3.517 (ULS) in Canada. If there are questions about the fuel you are using, contact your fuel supplier.

Diesel Fuel Types

Canadian fuels are blended for seasonal changes. Diesel Type “A” fuel is blended for better cold weather starting in extreme conditions; however, you might notice some power and fuel economy loss. If Type “A” fuel is used in warmer temperatures, stalling and hard starting may occur. Diesel Type “B” fuel is blended for higher temperatures experienced during most of the year.

Premium Diesel Fuel

Diesel fuels corresponding to the Engine Manufacturers Association (EMA) Recommended Guideline on Premium Diesel Fuel (FQP-1A) could provide better starting, less noise, and better vehicle performance, but their use is not required.

Biodiesel

What is biodiesel?

Biodiesel is a fuel produced from vegetable oils or animal fats that have been chemically modified to reduce the possibility of damage to the fuel system and engine.

Notice: **Raw vegetable oil or other unmodified bio-oils or fats are not biodiesel and must not be used in your vehicle as they could damage the fuel system and engine.**

What not to use

Do not use home-made biodiesel in your vehicle since its quality cannot be verified by approved scientific methods. Home test kits are not approved scientific methods.

Notice: **Any damage caused by raw, unmodified, or home-made biodiesel would not be covered by the vehicle warranty.**

Biodiesel blends

It is acceptable to use diesel fuel containing up to 20% biodiesel (B20). For low level, under 5%, biodiesel blends (B1 to B5), the fuel you use should meet the latest version of specification CAN/CGSB-3.520 (ULS). At the time of printing of this manual, a CGSB standard for B6-B20 is under development and has not been published. Until a CGSB B6-B20 specification is available, biodiesel blends containing more than 5% and up to 20% biodiesel must meet the latest version of ASTM specification D7467 (Biodiesel blend, B6-B20). If there are questions about the biodiesel-containing fuels you are using, contact your fuel supplier.

Notice: **Certain driving patterns are not compatible with biodiesel use. It is the operator's responsibility to ensure that biodiesel in the vehicle's tank does not lead to engine, fuel system, or exhaust after-treatment system damage.**

We neither encourage nor discourage the use of biodiesel blends for vehicles. As a renewable fuel, biodiesel provides some environmental benefits. However, biodiesel has unique properties and needs to be handled differently than diesel fuel. Its use presents additional risks and may not be appropriate in all situations. Certain vehicle operating modes increase these risks and should be avoided. Read further to determine if your driving habits are compatible with the use of biodiesel.

- Biodiesel fuel quality degrades with time and exposure to high temperature much more quickly than conventional diesel fuel.

  More frequent refueling provides the best opportunity to have a supply of fresh fuel.

  Owners who have very low fuel usage or who have vehicles stored for extended periods of time should avoid the use of biodiesel. Storage at hot ambient temperatures will accelerate biodiesel degradation.

  When vehicles will be stored for extended periods of time (greater than one month), they should be run out of biodiesel to below 1/4 tank, refueled with conventional Ultra Low Sulfur Diesel fuel, and driven several miles before storage.

- Biodiesel gels sooner than conventional diesel fuel at cold temperature, and biodiesel fuel requires proper blending for winter time operation.

  Fuels improperly blended for cold temperature operation may result in restricted fuel filters and degraded vehicle performance.

Your vehicle is equipped with a fuel heating system to provide a level of protection against filter plugging from gelling (waxing) of conventional diesel fuel and biodiesel blends. However, the system will not prevent all cases of plugged filters if the operating temperature is far below the temperature at which gelling or waxing of the fuel occurs (cloud point).

Use of biodiesel blends greater than B5 (5% blend) should be avoided in cold temperatures.

- Vehicles operated for extended periods of time on conventional diesel fuel and then switched to biodiesel blends may experience premature fuel filter clogging and require more frequent fuel filter service.

  With long term use of conventional diesel fuel, gum and varnish may be deposited within the tank and fuel system. These deposits, while not problematic with the use of conventional diesel fuel, may become loosened with a sudden switch to biodiesel blends and cause fuel filter plugging.

  This vehicle is equipped with a fuel filter restriction monitoring system that will alert you if the fuel filter requires service, but it will not prevent damage caused by poor quality biodiesel.

- Use of biodiesel blends will degrade the performance of your vehicle's water separator. Biodiesel reduces the effectiveness of the vehicle's water separator, and in the event of water contamination of the fuel, increases the risk of damage to the fuel system.

What Fuel to Use in Mexico

Notice: **Use of diesel fuel other than Ultra Low Sulfur Diesel (15 ppm sulfur maximum) will cause permanent damage to the exhaust after-treatment system. This damage would not be covered by the vehicle warranty.**

Ultra Low Sulfur Diesel fuel is not available in all regions of Mexico.

Refueling

Diesel fuel can foam when you fill the tank. This can cause the automatic pump nozzle to shut off, even though the tank is not full. If this happens, wait for the foaming to stop, and then try filling the tank more slowly. See *Filling the Tank on page 9-33*.

⚠ WARNING

Heat coming from the engine can cause the fuel to expand and force the fuel out of the tank. If something ignites the fuel, a fire could start and people could be burned. To help avoid this, try filling the tank more slowly and fill the fuel tank only until the automatic nozzle shuts off. Do not try to top it off.

Accidental Refueling with Gasoline

If you accidentally refuel with gasoline, your vehicle will run very rough, will produce smoke, and will have significantly reduced power. Avoid operating the vehicle and/or operate only at low speeds and/or low accelerator positions. Siphon or pump as much of the gasoline from the tank as possible, preferably until the fuel gauge reads near E (empty). Refuel with Ultra Low Sulfur Diesel fuel. Your dealer will be able to perform this procedure. Operating your vehicle for a prolonged period of time on gasoline could result in engine or fuel system damage which would not be covered by the vehicle warranty.

Cold Weather Operation

Follow the instructions listed previously under the heading “What Fuel to Use.”

Notice: **Never use home heating oil or gasoline in the vehicle. They can cause engine damage not covered by the vehicle warranty.**

In cold weather, the fuel filter could become clogged by wax naturally present in the fuel. To unclog it, move the vehicle to a warm garage area and allow the filter to warm up to between 0°C (32°F) and 10°C (50°F). You will not need to replace the filter. Additional information on the fuel filter follows.

Use of biodiesel blends greater than B5 (5% blend) should be avoided in cold temperatures.

Water in Fuel

⚠ WARNING

Diesel fuel containing water is still flammable. You could be burned. If you ever try to drain water from the fuel, keep sparks, flames, and smoking materials away from the mixture.

Notice: **If there is water in the diesel fuel and the weather is warm or humid, fungus and bacteria can grow in the fuel. They can damage the fuel system and fuel operated heater (FOH) (if equipped). A diesel fuel biocide can be used to sterilize the fuel system. However, the fuel system may still need to be cleaned. Your dealer can advise you of the appropriate solution.**

If the fuel tank needs to be purged to remove water, see your dealer or a qualified technician. Improper purging can damage the fuel system and block the FOH.

Sometimes, water can be pumped into the fuel tank along with the diesel fuel. This can happen if a service station does not regularly inspect and clean its fuel tanks, or if it gets contaminated fuel from its suppliers.

If this happens, a WATER IN FUEL SERVICE REQUIRED message will appear on the Driver Information Center (DIC). The water must be drained.

Water in Fuel Light Chart

If the WATER IN FUEL SERVICE REQUIRED message comes on, use this chart.

Problem	Recommended Action
Message comes on but does not remain on after an ignition cycle.	Water separator is approximately half full. Drain water as soon as possible. Water level may continue to increase.
Message remains on after an ignition cycle:	
At temperatures above freezing.	Drain fuel filter immediately. If no water can be drained and message stays on, see your dealer for assistance.

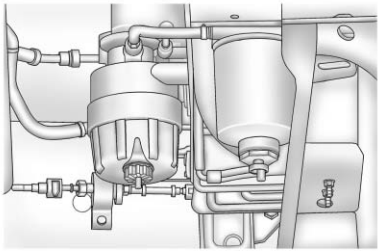
Problem	Recommended Action
At temperatures below freezing.	Drain fuel filter immediately. If no water can be drained, water may be frozen in water drain system or fuel lines. Move the vehicle to a warm location to thaw out, and then drain filter system.
Immediately after refueling, large amount of water possibly pumped into fuel tank.	Fuel tank purging required. See your dealer for assistance.

Notice: **Driving when this warning indicator is on, can damage the fuel injection system and the engine. If the indicator comes on right after a refuel, it means water was pumped into the fuel tank. Turn off the engine immediately. Then, have the water drained at once.**

To drain water:

1. Stop and park the vehicle in a safe place. Turn off the engine and apply the parking brake.
2. Remove the fuel cap.
3. Place a fuel-resistant container under the fuel filter(s). For pickup models, the filter drain valve is located in the engine compartment, on the passenger side of the vehicle, on the bottom of the fuel filter. For van models, the filter drain valves for the primary and secondary fuel filters are located in the chassis (inside frame rail) compartment. They are on the driver side of the vehicle, below the fuel filters.
4. For pickup models, open the drain valve by turning it two to three turns. Pump the primer until all of the water has been removed. When fuel empties from the valve, all the water has been drained. Close the valve hand tight.

   For van models, open the primary fuel filter drain valve by turning it two to three turns. Allow the filter to drain until all of the water has been removed. Close the valve hand tight. Repeat this process for the secondary fuel filter.



5. Remove the fuel-resistant container and properly dispose of the contaminated fuel. To find out how to properly dispose of contaminated diesel fuel, see “What to Do With Used Oil” under *Engine Oil Life System on page 10-10*.
6. Install the fuel cap.
7. For pickup models, start the engine and let it run for a few minutes. If the engine stalls, the fuel system may need to be primed. While draining the water from the fuel filter, air may enter the fuel system. If air has entered the fuel system the fuel system will need to be primed. For van models, start the engine and let it run for a few minutes.

If the WATER IN FUEL message/ warning light comes on again after driving a short distance or the engine runs rough or stalls, a large amount of water has probably been pumped into the fuel tank. The fuel tank should be purged.

Fuel Priming

In order for the fuel system to work properly, the fuel lines must be full of fuel and contain no air. If air gets into the fuel lines, it will be necessary to prime the fuel lines to eliminate air before operating the vehicle and the fuel operated heater (FOH).

If air is in the fuel lines. One of the following may have happened:

- The vehicle ran out of fuel.
- The fuel filter was removed for servicing or replacement.
- The fuel lines were removed or disconnected for servicing.
- The fuel filter water drain valve was opened while the engine was running.
- The fuel operated heater (FOH) pump and FOH fuel lines were removed or disconnected for servicing.

If one or more of the above occur, it is very likely that air has entered the fuel system and priming the fuel system is needed before operating the vehicle. Air in the fuel lines does not harm the engine, the fuel operated heater (FOH), or the vehicle.

However, the engine and/or the fuel operated heater (FOH) may not be able to start until the fuel system is primed and the air is removed.

To Prime the Vehicle (Pickup Models)

The vehicle is equipped with a priming pump which is part of the engine mounted fuel filter. The priming pump is hand operated and is designed to bring fuel to the engine to eliminate any air in the fuel lines. To prime the engine:

1. Correct the condition that caused the loss of prime by making sure there is fuel in the tank.
2. Make sure the fuel filter has been installed and properly tightened.
3. Make sure the fuel lines are properly connected and the fuel filter is cool enough to touch.
4. Remove any dirt from the fuel filter head and vent valve by wiping with a cloth.
5. Open the fuel filter vent valve by turning the screw counterclockwise several full turns. The vent valve is located on top of the fuel filter housing.
6. Repeatedly push down on the fuel filter priming pump with the palm of your hand. The pump is located on top of the fuel filter housing. Let the pump return upward between pushes.
7. Operate the priming pump until a small amount of fuel seeps from the vent valve. When fuel is seen, the filter is now full of fuel and the system should be primed.
8. Close the vent valve. Clean any fuel that accumulated on the fuel filter. Attempt to start the engine. The engine may start and stall. If this occurs, operate the priming pump several times in between starting attempts. Once the engine stays running, allow it to idle for a few minutes. Check the filter for leaks.

To Prime the Vehicle (Van Models)

The vehicle has an electric priming pump. The priming pump is operated electrically and is designed to bring fuel to the engine to eliminate any air in the fuel lines. To prime the engine:

1. Correct the condition that caused the loss of prime by making sure there is fuel in the tank.
2. Turn the ignition key on for 30 seconds. The fuel pump will be operating and starting the priming process. Do not start the engine during the first 30 seconds.
3. After completing the initial prime in Step 2, turn the ignition off, then back to start, and crank the engine for 15 seconds.
4. If the engine does not start, repeat Steps 2 and 3 until the engine starts.

5. If the engine does not run after repeating Steps 2 and 3 three times, turn the ignition key off for 60 seconds, allowing the Electronic Control Module (ECM) to reset.
6. Repeat the above steps until the engine starts.
7. If the engine runs, but does not run smoothly, increase the engine speed slightly by pressing the accelerator pedal. This will help to force out air through the system.
8. If the engine starts and runs but stalls again, turn the ignition key off for 60 seconds to reset the ECM and repeat the steps above.
9. When the engine starts, let it idle for a few minutes and check the filters for any leaks.

To Prime the Fuel Operated Heater (FOH) Fuel Lines (Van Models)

See your dealer or qualified technician if the FOH fuel lines need to be primed.

Running Out of Fuel

Pickup Models

If the engine stalls and you think that you have run out of fuel, do this to restart the engine:

⚠ WARNING

Diesel fuel is flammable. It could start a fire if it gets on hot engine parts. You could be burned. Do not let too much fuel flow from the air bleed valve, and wipe up any spilled fuel with a cloth.

1. If parked on a level surface, add at least two gallons of fuel. However, if parked on a slope, up to five gallons of fuel might need to be added.
2. Follow the fuel priming procedure earlier in this section to prime the fuel filter.
3. Turn the ignition key to START for 10 to 15 seconds at a time until the engine starts. If the engine tries to run, but does not run smoothly, increase the rpm a little using the accelerator pedal. This will help force air through the system.
4. Return to Step 2 if the engine stalls and will not restart.

Van Models

If the engine stalls and you think that you may have run out of fuel, do this to restart the engine:

1. If parked on a level surface, add at least one gallon of fuel. However, if parked on a slope, up to five gallons of fuel might need to be added.

2. Follow the vehicle fuel system priming procedure earlier in this section to re-prime the system and re-start the engine.

The check engine light may come on if the vehicle has run out of fuel. This light may stay on for a few drive cycles after the condition is corrected, but will eventually clear itself.

The fuel operated heater stops automatically when the fuel tank volume is less or equal to 10 percent of the total tank volume. If the vehicle runs out of fuel, the FOH fuel lines will not need to be primed because they will still have fuel remaining.

Fuel Filter Replacement

Pickup Models

If you want to change the fuel filter yourself, here's how to do it:

⚠ WARNING

Diesel fuel is flammable. It could start a fire if something ignites it, and you could be burned. Do not let it get on hot engine parts, and keep matches or other ignition sources away.

First, drain any water from the filter following the procedure for draining water listed previously.

The vehicle's engine must be off until the end of this procedure.

The fuel filter is located in the engine compartment on the passenger side of the vehicle.

1. Apply the parking brake. Access the fuel filter through the passenger side wheel house opening. It is not necessary to remove all of the wheel liner fasteners.
2. Remove only the necessary fasteners to allow the rear of the wheel liner to be lowered enough for fuel filter access.
3. Unplug the water sensor wire connected to the fuel filter and unscrew the filter element.
4. Remove the filter element. If there is any dirt on the filter sealing surface, clean it off. Remove and reuse the water sensor float switch located on the bottom of the fuel filter.

5. Install the new filter element.
6. Reinstall and tighten the filter container and reconnect the water sensor wire to the filter.
7. Reposition the wheel liner.
8. Install and tighten fasteners.
9. Use the fuel filter priming procedure earlier in this section to prime the fuel filter.
10. Start the engine and let it idle for five minutes. Check the fuel filter and air bleed valve for leaks.
11. Reset the fuel filter monitor. See *Fuel System Messages on page 5-11* for more information.

Van Models

If the fuel operated heater (FOH) is not working, the FOH line requires priming. See your dealer for service. See *Fuel Operated Heater (FOH) (Van Models Only) on page 9-10* for more information.

If you want to change the fuel filter yourself, here's how to do it:

⚠ WARNING

Diesel fuel is flammable. It could start a fire if something ignites it, and you could be burned. Do not let it get on hot engine parts, and keep matches or other ignition sources away.

First, drain any water from the filter following the procedure for draining water listed previously.

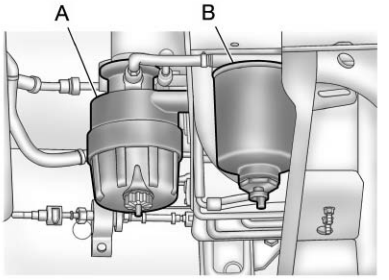
The vehicle's engine must be off until the end of this procedure.

The fuel filters are located on the driver side frame rail in front of the fuel tank.

To minimize fuel siphoning from the fuel tank during fuel filter replacement, be sure the fuel tank is less than 3/4 full.

Primary Filter (A)

1. Apply the parking brake.



2. Unplug the water sensor wire connected to the fuel filter (lowest wire) and unscrew the filter's cap.
3. Remove the filter element. If there is any dirt on the filter sealing surface, clean it off.
4. Install the new filter element.
5. Reinstall and tighten the filter's cap and reconnect the water sensor wire to the filter.

6. Follow the vehicle fuel system priming procedure earlier in this section to re-prime the system.
7. Start the engine and let it idle for five minutes.

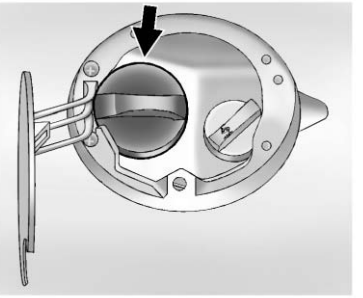
Secondary Filter (B)

1. Apply the parking brake.
2. Unscrew the filter element.
3. Remove the filter element. If there is any dirt on the filter sealing surface, clean it off. Remove and reuse the water drain valve located at the bottom of the fuel filter.
4. Install and tighten the new filter element.
5. Follow the vehicle fuel system priming procedure earlier in this section to re-prime the system.
6. Start the vehicle and let it idle for 5 minutes.

Filling the Tank

⚠ WARNING

Fuel vapor burns violently and a fuel fire can cause bad injuries. To help avoid injuries to you and others, read and follow all the instructions on the fuel pump island. Turn off the engine when refueling. Do not smoke near fuel or when refueling the vehicle. Do not use cellular phones. Keep sparks, flames, and smoking materials away from fuel. Do not leave the fuel pump unattended when refueling the vehicle. This is against the law in some places. Do not re-enter the vehicle while pumping fuel. Keep children away from the fuel pump; never let children pump fuel.



Van Shown, Pickup Similar

The green fuel cap is located behind a hinged door on the driver side of the vehicle. On van models, the blue diesel exhaust fluid cap is also behind the fuel door. Do not remove both caps at the same time.

For chassis-cab models, refuel the front tank first, or in instances when only a partial fuel fill is desired. An automatic transfer mechanism will maintain approximately equal fuel levels in both tanks, so no switching is required by the operator.

To remove the fuel cap, turn it slowly to the left (counterclockwise).

⚠ WARNING

Fuel can spray out on you if you open the fuel cap too quickly. If you spill fuel and then something ignites it, you could be badly burned. This spray can happen if the tank is nearly full, and is more likely in hot weather. Open the fuel cap slowly and wait for any hiss noise to stop. Then unscrew the cap all the way.

Be careful not to spill diesel fuel. Do not top off or overfill your tank, and wait a few seconds after you have finished pumping before you remove the nozzle. Clean fuel from painted surfaces as soon as possible. See “Washing Your Vehicle” in the Index of the owner manual. When you put the fuel cap back on, turn it to the right (clockwise) until you hear a clicking sound. Make sure you fully install the cap.

⚠ WARNING

If a fire starts while you are refueling, do not remove the nozzle. Shut off the flow of fuel by shutting off the pump or by notifying the station attendant. Leave the area immediately.

Notice: **If you need a new fuel cap, be sure to get the right type. Your dealer can get one for you. If you get the wrong type, it may not fit properly.**

Notice: **If your vehicle has been accidentally filled with gasoline, do not run the engine or severe engine damage can occur. Contact your dealer to have the fuel system flushed.**

Filling a Portable Fuel Container

⚠ WARNING

Never fill a portable fuel container while it is in the vehicle. Static electricity discharge from the container can ignite the fuel vapor. You can be badly burned and the vehicle damaged if this occurs. To help avoid injury to you and others:

- Dispense fuel only into approved containers.
- Do not fill a container while it is inside a vehicle, in a vehicle's trunk, pickup bed, or on any surface other than the ground.

(Continued)

WARNING (Continued)

- Bring the fill nozzle in contact with the inside of the fill opening before operating the nozzle. Contact should be maintained until the filling is complete.
- Do not smoke while pumping fuel.
- Do not use a cellular phone while pumping fuel.

Towing

Trailer Towing

When towing at high elevation on steep uphill grades, consider the following:

Engine coolant at higher elevation will boil at a lower temperature than at or near sea level. If the engine is turned off immediately after towing at high elevation on steep uphill grades, the vehicle may show signs similar to engine overheating. To avoid this, let the engine run while parked (preferably on level ground) with the transmission in P (Park) and the park brake applied for at least five minutes before turning the engine off. If the overheat warning comes on, see *Engine Overheating on page 10-25*.

Use the following chart to determine how much the vehicle can weigh, based upon your vehicle model and options.

Vehicle	Axle Ratio	Max. Trailer Wt.	GCWR**
C-2500 Pickup Models — 2WD*			
Pickup Model Extended Cab Standard Box[1]	3.73	7 938 kg (17,500 lbs)	11 113 kg (24,500 lbs)
Pickup Model Crew Cab Standard Box[1]	3.73	7 893 kg (17,400 lbs)	11 113 kg (24,500 lbs)
Pickup Model Sierra Denali[1]	3.73	7 802 kg (17,200 lbs)	11 113 kg (24,500 lbs)
Pickup Model Regular Cab Long Box[1]	3.73	8 074 kg (17,800 lbs)	11 113 kg (24,500 lbs)
Pickup Model Extended Cab Long Box[1]	3.73	7 893 kg (17,400 lbs)	11 113 kg (24,500 lbs)
Pickup Model Crew Cab Long Box[1]	3.73	7 802 kg (17,200 lbs)	11 113 kg (24,500 lbs)
K-2500 Pickup Models — 4WD*			
Pickup Model Extended Cab Standard Box[1]	3.73	7 802 kg (17,200 lbs)	11 113 kg (24,500 lbs)
Pickup Model Crew Cab Standard Box[1]	3.73	7 575 kg (16,700 lbs)	11 113 kg (24,500 lbs)
Pickup Model — Sierra Denali[1]	3.73	7 076 kg (15,600 lbs)	11 113 kg (24,500 lbs)
Pickup Model Regular Cab Long Box[1]	3.73	7 938 kg (17,500 lbs)	11 113 kg (24,500 lbs)
Pickup Model Extended Cab Long Box[1]	3.73	7 484 kg (16,500 lbs)	11 113 kg (24,500 lbs)
Pickup Model Crew Cab Long Box[1]	3.73	7 076 kg (15,600 lbs)	11 113 kg (24,500 lbs)

Vehicle	Axle Ratio	Max. Trailer Wt.	GCWR**
C-3500 Pickup Model Extended Cab — 2WD*			
Single Rear Wheels[1]	3.73	7 847 kg (17,300 lbs)	11 113 kg (24,500 lbs)
Dual Rear Wheels[3]	3.73	9 752 kg (21,500 lbs)	13 245 kg (29,200 lbs)
C-3500 Pickup Model Crew Cab Standard Box — 2WD*			
Single Rear Wheels[1]	3.73	7 802 kg (17,200 lbs)	11 113 kg (24,500 lbs)
Single Rear Wheels — Sierra Denali[1]	3.73	7 756 kg (17,100 lbs)	11 113 kg (24,500 lbs)
C-3500 Pickup Model Crew Cab Long Box — 2WD*			
Single Rear Wheels[1]	3.73	7 847 kg (17,300 lbs)	11 113 kg (24,500 lbs)
Dual Rear Wheels[3]	3.73	9 752 kg (21,500 lbs)	13 245 kg (29,200 lbs)
Dual Rear Wheels — Sierra Denali[3]	3.73	9 662 kg (21,300 lbs)	13 245 kg (29,200 lbs)
K-3500 Pickup Model Regular Cab — 4WD*			
Single Rear Wheels[1]	3.73	7 893 kg (17,400 lbs)	11 113 kg (24,500 lbs)
Dual Rear Wheels[2]	3.73	9 843 kg (21,700 lbs)	13 245 kg (29,200 lbs)

Vehicle	Axle Ratio	Max. Trailer Wt.	GCWR**
K-3500 Pickup Model Extended Cab — 4WD*			
Single Rear Wheels[1]	3.73	7 666 kg (16,900 lbs)	11 113 kg (24,500 lbs)
Dual Rear Wheels[4]	3.73	9 662 kg (21,300 lbs)	13 245 kg (29,200 lbs)
K-3500 Pickup Model Crew Cab Standard Box — 4WD*			
Single Rear Wheels[1]	3.73	7 711 kg (17,000 lbs)	11 113 kg (24,500 lbs)
Single Rear Wheels — Sierra Denali[1]	3.73	7 620 kg (16,800 lbs)	11 113 kg (24,500 lbs)
K-3500 Pickup Model Crew Cab Long Box — 4WD*			
Single Rear Wheels[1]	3.73	7 620 kg (16,800 lbs)	11 113 kg (24,500 lbs)
Dual Rear Wheels[4]	3.73	9 571 kg (21,100 lbs)	13 245 kg (29,200 lbs)
Dual Rear Wheels — Sierra Denali[4]	3.73	9 525 kg (21,000 lbs)	13 245 kg (29,200 lbs)
Vans Models — 2WD			
G2500 Cargo Van Short Wheelbase	3.54	4 536 kg (10,000 lbs)	7 711 kg (17,000 lbs)
G2500 Cargo Van Long Wheelbase	3.54	4 536 kg (10,000 lbs)	7 711 kg (17,000 lbs)
G3500 Cargo Van Short Wheelbase	3.54	4 536 kg (10,000 lbs)	7 711 kg (17,000 lbs)
G3500 Cargo Van Long Wheelbase	3.54	4 536 kg (10,000 lbs)	8 391 kg (18,500 lbs)

Vehicle	Axle Ratio	Max. Trailer Wt.	GCWR**
G3500 Passenger Van Short Wheelbase	3.54	4 536 kg (9,900 lbs)	7 711 kg (17,000 lbs)
G3500 Passenger Van Long Wheelbase	3.54	4 536 kg (9,700 lbs)	7 711 kg (17,000 lbs)

*Fifth-wheel or gooseneck kingpin weight should be 15 percent to 25 percent of trailer weight up to 1 587 kg (3,500 lbs) maximum.
**The Gross Combination Weight Rating (GCWR) is the total allowable weight of the completely loaded vehicle and trailer including any passengers, cargo, equipment and conversions. The GCWR for the vehicle should not be exceeded.
[1]Trailer rating limited to 5 897 kg (13,000 lbs) with ball hitch.
[2]Trailer rating limited to 7 257 kg (16,000 lbs) with ball hitch.
[3]Trailer rating limited to 7 484 kg (16,500 lbs) with ball hitch.
[4]Trailer rating limited to 7 711 kg (17,000 lbs) with ball hitch.

See “Towing a Trailer” in the owner manual for more information.

Conversions and Add-Ons

Power Take-Off (PTO)

The power take-off (PTO) is an upfitter integrated system that allows the user to create an auxiliary power source for running add-on equipment, such as salt spreaders, snow plows, winches and lift buckets. The PTO system controls engine speed to values higher than normal base idle, PTO load relay engagement and shutdown of the engine.

Primary PTO Operating Modes

PTO modes of operation include the following:

- Preset PTO Mode: (Stationary operation only)
- Variable PTO Mode: (Stationary and mobile operation)

The PTO stationary mode provides both in-cab and remote controls. The in-cab controls are enabled as the factory preset. The remote controls are disabled. This factory preset configuration can be programmed to enable the remote controls, and/or disable the in-cab PTO controls. See your dealer for more information.

PTO Sub – Modes

The primary PTO modes have the following sub-modes:

- Engine speed control
- PTO load relay engagement/ disengagement
- Remote engine start and shutdown (Stationary vehicle operation only)

PTO Enabling/Disabling Conditions

Enabling Conditions – Stationary PTO

To engage stationary PTO operation, the following conditions must be met:

- The engine must be running.
- The vehicle cannot be moving and the parking brake must be set.
- The shift lever must be in P (Park) or N (Neutral).
- The brake pedal must not be pressed.
- The engine speed must be less than the maximum allowed PTO engage speed of 1500 rpm. The PTO engage speed can be adjusted by a service technician.

For in-cab PTO operation:

Press and release the | position on the PTO switch. The PTO LED light will blink fast until the PTO load becomes engaged. The LED light will then be on steady. The −/SET and +/RES switch positions can then be used to establish the desired PTO operating speed.

For remote PTO operation:

Press and release the remote PTO arming switch, then within five seconds, move the PTO enable switch from OFF to ON (open to closed). The remote LED light will come on when the PTO Load is engaged. The PTO remote SET switch can then be used to establish the desired PTO operating speed. Additional information is available in the service manual for the correct wiring configuration and programming of the remote PTO enable and set switches.

These switches are accessed through the PTO upfitter connector, located under the passenger side door.

Enabling Conditions – Mobile PTO

To engage mobile PTO operation, the following conditions must be met prior to turning on PTO:

- The engine must be running.
- The vehicle speed must be less than the PTO top vehicle speed limit. The default setting is 80 km/h (50 mph). This limit can be adjusted by a service technician.
- The shift lever may be in any position.
- The brake must be pressed and then released. The brake must then remain released.
- Cruise control cannot be active.
- Engine speed must be less than the maximum allowed PTO engage speed of 1500 rpm.
- Press and release the | position on the PTO switch. The PTO LED light will blink fast until the PTO load becomes engaged, at which point the LED light will be on steady. The −/SET and +/RES switch positions can then be used to establish the desired PTO operating speed. See Variable PTO Mode – PTO Switch operation below.

DIC WARNING MESSAGES

One or more of the following Driver Information Center (DIC) messages may appear on the instrument panel cluster if the PTO will not engage. The operator must take the action indicated, then again press and release the | position of the PTO switch.

- PTO: SHIFT TO PARK OR NEUTRAL (Stationary only)
- PTO: SET PARK BRAKE (Stationary only)
- PTO: PRESS & RELEASE BRAKE (Mobile only)

- PTO: RELEASE BRAKE
- PTO: REDUCE VEHICLE SPEED
- PTO: REDUCE ENGINE SPEED
- PTO: DISENGAGE CRUISE CONTROL (Mobile only)

In addition to these messages, the PTO switch LED will indicate when all conditions required to engage PTO have not been met. When enabling PTO, the LED will turn on, then off after one second. Under normal operating conditions, the PTO LED will remain on throughout the PTO operating cycle.

PTO Disengage Conditions

To disengage the stationary or mobile PTO operation, do one of the following:

- Press the brake. PTO will disengage immediately. The PTO LED will blink slowly, indicating that the PTO set speed is stored in memory. Pressing the +/RES switch position will restore engine speed to the stored PTO set speed. PTO can also be programmed to reengage at PTO standby speed upon releasing the brake pedal (mobile PTO only).
- Press and release the ◯ on the PTO in-cab switch. The engine speed will return to normal engine idle. The PTO LED light will go off indicating the PTO load relay has been disengaged and PTO set speed has been cleared from memory.
- From the remote PTO controls, move the speed enable switch to the off position. The engine will return to normal idle. The PTO load relay is disengaged. PTO memory speed is also cleared. (Stationary PTO only)
- From the remote PTO controls, press the remote engine shutdown switch. PTO is disengaged and the engine is shutdown simultaneously. (Stationary remote PTO only)

The mobile PTO mode will also disengage if the following conditions are detected by the vehicle electronics:

- The PTO load becomes disengaged. (See service manual)
- Vehicle speed exceeds 80 km/h (50 mph).
- Engine speed exceeds the maximum allowed PTO operating speed of 3100 rpm (factory setting 2100 rpm).
- The PTO control system will attempt to limit accelerator pedal and PTO switch input as the vehicle approaches the above operational limits. There are some vehicle conditions, such as down hill acceleration, which may cause vehicle speed and/or engine speed limits to be exceeded. Under these conditions, PTO is disengaged.

The stationary PTO mode will also disengage if any of the following conditions are detected by the vehicle electronics:

- Movement of the vehicle.
- The park brake is released.
- The transmission is shifted from P (Park) or N (Neutral) to D (Drive) or R (Reverse).
- The PTO load becomes disengaged. (See service manual)

Preset PTO Mode

Preset PTO can only be used when the vehicle is not moving. The engine speed is initially set to a stand-by engine speed (850 rpm) when the PTO in-cab | switch position is pressed or, by pressing and releasing the remote arming switch. Then within five seconds, assert the remote PTO enable switch to on. This provides an initial start-up engine speed to match the engagement of the PTO load.

The PTO standby engine speed can be reprogrammed to a higher speed by your dealer.

Choose one of two factory presets by pressing the PTO In-cab −/SET or +/RES switch positions or the remote PTO SET switch. Speed 1 and Speed 2 are programmable by a service technician from base engine idle rpm to max PTO operation speed (3100 rpm).

- Speed 1: Pressing the −/SET position of the PTO switch results in a preset speed of 1250 rpm.
- Speed 2: Pressing the +/RES position of the PTO switch results in a preset speed of 1700 rpm.

Pressing the ◯ switch position on the PTO in-cab switch or moving the remote PTO enable switch to OFF results in the return of the engine speed back to normal idle. The PTO load relay is also disengaged.

Maximum PTO Operating Speed: During PTO operation, the accelerator pedal can be pressed to adjust the engine speed. To protect the PTO from over-speed, the PTO system will disengage when the engine speed exceeds 2100 rpm.

The Stationary PTO Mode provides both in-cab and remote controls. The in-cab controls are enabled as the factory preset. The remote controls are disabled. This factory preset configuration can also be reprogrammed to enable the remote controls, and disable the in-cab PTO controls (i.e., PTO switch, accelerator pedal). See your dealer for more information.

Variable PTO Mode

In this mode, the vehicle can be programmed for stationary or mobile operation.

The variable PTO mode controls engine speed and PTO load engagement is selected by either the PTO in-cab or remote switches.

Engine speed selection is variable between base engine idle speed and a maximum of 3100 rpm (factory setting 2100 rpm).

In the mobile PTO mode, the vehicle will operate at a vehicle speed resulting from the current PTO engine speed request and current transmission gear range selected.

Vehicle speed stability is greatly improved by shifting into the transmission manual mode because upshifts are limited. This reduces the maximum vehicle speed while allowing high engine speed operation. Therefore, low vehicle speed operation 16-40 km/h (10-25 mph) and high PTO engine speed (1,500–2,000 rpm) can be achieved in the manual mode 1 and 2 transmission ranges.

PTO Switch Operation

The In-cab PTO Switch has four positions: |, ◯, −/SET, and +/RES.

|: This is the PTO switch On position.

To engage PTO, press and release the in-cab | switch position or, press and release the remote PTO arming switch, then within five seconds, assert the remote enable switch to on. The vehicle will increase engine speed to a factory preset engine speed (800 rpm). This PTO stand-by speed is not intended to be an operational PTO speed, but allows the engagement of the PTO at lower initial start-up rpm to match with the engagement of the PTO load relay.

The initial stand-by speed can be adjusted by holding the accelerator to the desired engine speed, then pressing and releasing the | in-cab PTO switch position. The current engine speed will become the new stand-by speed. This adjustment can only be done once at the initial engagement of PTO. The initial stand-by speed adjustment must be between engine base idle speed and 1800 rpm (maximum PTO engage speed).

◯: This is the PTO switch Off position.

Press and release the in-cab ◯ switch position or assert the remote enable switch to off to disengage PTO. The engine speed will be reduced to the base idle speed and the PTO load relay will be disengaged.

−/SET (SET/TAP-DOWN/COAST)

SET: Press and hold the accelerator to obtain the desired engine speed, then press and release the −/SET position of the PTO switch. The current engine speed will be maintained. This action can be repeated as desired to a higher rpm value. The PTO set speed cannot exceed 2100 rpm.

TAP-DOWN: Press and release the −/SET switch position on the PTO switch to reduce the engine speed by increments of 100 rpm.

COAST: Press and hold the −/SET switch position on the PTO switch to reduce the rpm by 200 rpm per second until the desired engine speed is reached or until the initial PTO standby speed is reached.

+/RES (RESUME/TAP-UP/ACCEL)

RESUME: When a PTO set speed has been achieved, press and release the brake pedal. Engine speed will reduce to basic idle speed. The PTO LED will blink slowly indicating the previous PTO set speed has been retained in memory. Press and release the +/RES switch position to resume the previous PTO set speed. The PTO set speed cannot exceed 2100 rpm.

TAP-UP: Press and release the +/RES position to increase the engine speed by increments of 100 rpm.

ACCEL: Press and hold the +/RES position to increase the rpm by 200 rpm per second until the desired engine speed is reached or until the maximum allowable PTO set speed is reached.

Remote Engine Start Control

The vehicle's PTO system allows the engine to be remotely started while operating in the stationary PTO mode. The vehicle wiring system provides for connections to a remote engine start arming switch and remote starting switch. These connections are accessed through the upfitter connector.

The remote start function is initiated by a sequence of switch actions, in addition to several vehicle conditions. The vehicle ignition key can be in any position or removed from the ignition. The following conditions must be met before attempting to remote start the engine:

- The vehicle must be configured for stationary PTO operation by a qualified dealer.
- The parking brake must be set.
- The transmission shift lever must be in P (Park).
- The vehicle hood must be closed.

Once the above conditions are met, continue the remote start by doing the following steps using the remote PTO controls:

1. Press and release the remote start arming switch.
2. Within five seconds of releasing the remote start arming switch, press and hold the engine start switch for about two seconds (horn will sound) until the engine starts.
3. Release the remote engine start switch.

To enable normal PTO operation after remotely starting the vehicle:

1. Press and release the remote start arming switch.
2. Within five seconds of releasing the remote start arming switch, the PTO remove enable switch must be moved from OFF to ON.
3. The PTO system will raise engine rpm to standby speed and engage the PTO load. Press the remote PTO −/SET or +/RES switch to elevate PTO to the desired engine operating speed.

Remote Engine Shutdown Control

The vehicle's PTO system allows for remote engine shutdown while operating in the stationary PTO mode. This feature has the following functions:

- Engine shutdown using the operator remote switch: The vehicle wiring system provides remote engine shutdown switch connections, which is accessed through the PTO upfitter connector.
- Timed auto-engine shutdown: The timed auto-engine shutdown feature provides the means to shut down the engine automatically after a predefined time. PTO must be operational for this function to be active.
- Engine shutdown based on critical engine conditions: The engine will be shutdown when PTO is operating if a critical engine condition is detected by the vehicle system (i.e., low oil, low oil pressure, hot engine, hot transmission, low fuel, diesel particulate filter regeneration). If PTO operation is continued when critical engine conditions are present, a horn chirp warning will occur after 2 to 5 minutes. The engine will be shutdown 2 minutes after the horn warning. The operator can re-start the engine with the ignition key. The above horn warning and engine shutdown will again occur if the critical engine condition is still present.

Prolonged or Extended PTO Operation

While operating the vehicle in stationary PTO mode, the Diesel Particulate Filter (DPF) will continue to filter the exhaust and accumulate soot. The engine control system, depending on the speed and load being applied by the PTO, may not be able to generate enough energy or adequate heat needed to clean or regenerate the DPF. Continued operation under conditions that do not allow effective regeneration or cleaning will eventually plug the DPF and result in reduced power.

The ENGINE POWER IS REDUCED Driver Information Center (DIC) message and Malfunction Indicator Lamp will be displayed, and dealer service will be required to return the vehicle to normal, full power operation. To prevent this from occurring, frequently monitor the vehicle during PTO operation. If the DIC message is displayed during PTO operation, see *Diesel Particulate Filter (Exhaust Filter) on page 9-10* for information on how to clean or regenerate the DPF. Also see "Remote Engine Shutdown Control" earlier in this section.

Factory Preset Parameters

The following table lists the factory preset parameters. These may be altered by the service technician to configure the various PTO features.

Programmable Parameters	Factory Setting	Minimum Value	Maximum Value
PTO In-cab Control	ENABLED	DISABLED	ENABLED
PTO Remote Control	DISABLED	DISABLED	ENABLED
Type of Set Switch Operation	MOMENTARY	MOMENTARY	LATCHING
Press ON then go to Set 1 Speed	DISABLED	DISABLED	ENABLED
Remote Engine Start	DISABLED	DISABLED	ENABLED
Remote Engine Shutdown	DISABLED	DISABLED	ENABLED
Load feedback	DISABLED	DISABLED	ENABLED
Engage Relay	DISABLED	DISABLED	ENABLED
Keep Relay engage during braking	DISABLED	DISABLED	ENABLED
Action after brake is released	RETURN TO BASE IDLE RPM	RETURN TO BASE IDLE RPM	RETURN TO STANDBY RPM
Auto Engine Shutdown Timer	ENABLED	DISABLED	ENABLED
Eng. Shutdown due to Failure	DISABLED	DISABLED	ENABLED

Programmable Parameters	Factory Setting	Minimum Value	Maximum Value
Engine Shutdown warning	DISABLED	DISABLED	ENABLED
Set Low Fuel level for Engine Shutdown	15%	0	25%
Engine Run Time While PTO is Active – Timer	7 Hours	4 minutes	7 hours
Min. PTO Engage Speed	500 RPM	500 RPM	1800 RPM
Max. PTO Engine Speed	1800 RPM	950 RPM	3100 RPM
PTO Standby RPM	850 RPM	500 RPM Normal engine idle will override if higher than Standby Speed	3100 RPM
PTO Set Speed 1	1250 RPM	500 RPM PTO Set Speed 1 cannot be set below PTO Standby speed	3100 RPM
PTO Set Speed 2	1700 RPM	500 RPM PTO Set Speed 2 cannot be set below PTO Standby speed	3100 RPM
Maximum Operating Speed	2100 RPM	500 RPM	3100 RPM
Tap Step	100 RPM	4 RPM	500 RPM
Ramp Rate	200 RPM	4 RPM	1000 RPM

Programmable Parameters	Factory Setting	Minimum Value	Maximum Value
Maximum Vehicle Speed	129 km/h (80 mph)	30 km/h (18 mph)	129 km/h (80 mph)
Minimum Remote Accelerator Voltage	0.25 V	0.0 V	2.5 V
Maximum Remote Accelerator Voltage	4.75 V	2.5 V	5.0 V
Wheel Speed Sensitivity	HIGH	LOW, MEDIUM, HIGH	
Remote Set Switch Transition to Low Voltage (<1.66 V)	SET_SPEED 1	STANDBY SPEED, SET SPEED_1 or SET SPEED_2	
Remote Set Switch Transition to Open State (>1.66 V, <3.33 V)	PTO_STANDBY	STANDBY SPEED, SET SPEED_1 or SET SPEED_2	
Remote Set Switch Transition to High Voltage (>3.33 V)	SET_SPEED 2	STANDBY SPEED, SET SPEED_1 or SET SPEED_2	

If the PTO factory preset parameters do not match the settings described above, then they may have already been altered in order to satisfy the requirements of the installed PTO system and body equipment.

See www.gmupfitter.com for more information on the installation of wiring and programming for PTO aftermarket equipment.

Vehicle Care

General Information
Accessories and Modifications 10-1

Vehicle Checks
Engine Compartment Overview 10-4
Engine Oil 10-7
Engine Oil Life System 10-10
Automatic Transmission Fluid 10-11
Engine Air Cleaner/Filter 10-17
Cooling System 10-20
Engine Coolant 10-21
Engine Overheating 10-25
Starter Switch Check 10-26
Automatic Transmission Shift Lock Control Function Check 10-27
Ignition Transmission Lock Check 10-27
Park Brake and P (Park) Mechanism Check 10-27

Electrical System
Engine Compartment Fuse Block 10-28

General Information

Accessories and Modifications

Adding non-dealer accessories or making modifications to the vehicle can affect vehicle performance and safety, including such things as airbags, braking, stability, ride and handling, emissions systems, aerodynamics, durability, and electronic systems like antilock brakes, traction control, and stability control. These accessories or modifications could even cause malfunction or damage not covered by the vehicle warranty.

Damage to vehicle components resulting from modifications or the installation or use of non-GM certified parts, including control module or software modifications, is not covered under the terms of the vehicle warranty and may affect remaining warranty coverage for affected parts.

GM Accessories are designed to complement and function with other systems on the vehicle. Your GM dealer can accessorize the vehicle using genuine GM Accessories. When you go to your GM dealer and ask for GM Accessories, you will know that GM-trained and supported service technicians will perform the work using genuine GM Accessories.

See your vehicle's Warranty booklet for more information.

Aftermarket Engine Performance Enhancement Products and Modifications

Some aftermarket engine performance products and modifications promise a way to increase the horsepower and torque levels of the vehicle's powertrain.

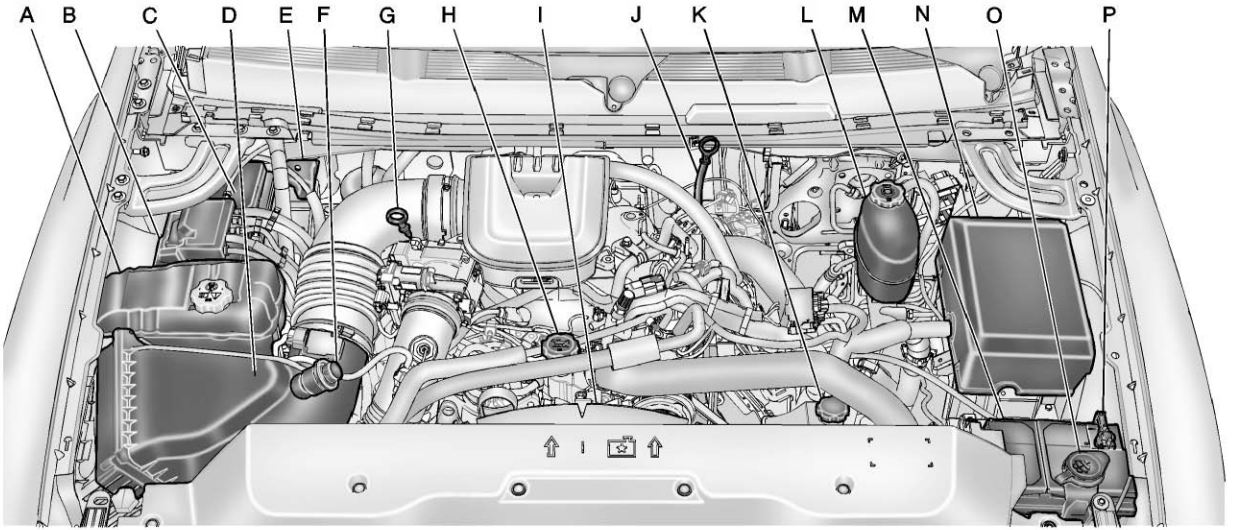
You should be aware that these products could have harmful effects on the performance and life of the engine, exhaust emission system, transmission, and drivetrain. The engines, transmissions, and drivetrains have been designed and built to offer industry leading durability and performance in the most demanding applications.

Engine power enhancement products may enable the engine to operate at horsepower and torque levels that could damage, create failure, or reduce the life of the engine, engine emission system, transmission, and drivetrain.

Damage, failure, or reduced life of the engine, transmission, emission system, drivetrain, or other vehicle components caused by aftermarket engine performance enhancement products or modifications might not be covered under the vehicle warranty.

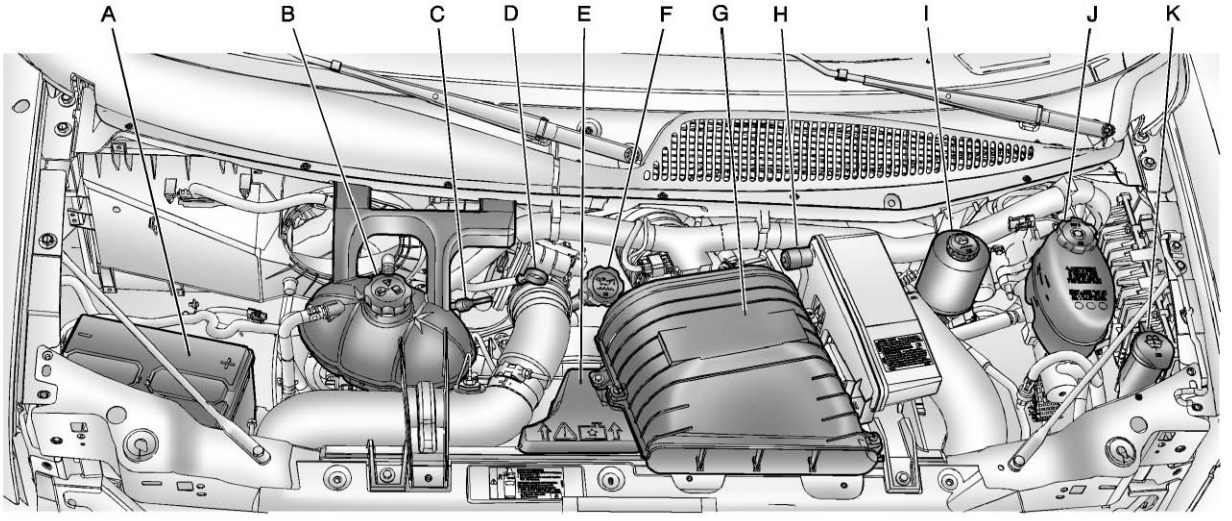
Vehicle Checks

Engine Compartment Overview



United States Pickup models Shown, Canada Similar

A. Coolant Surge Tank and Pressure Cap
B. Remote Positive (+) Terminal
C. Battery
D. Engine Air Cleaner/Filter
E. Diesel Exhaust Fluid (DEF) Fill Tube
F. Engine Air Cleaner/Filter Restriction Indicator (If Equipped)
G. Engine Oil Dipstick
H. Engine Oil Fill Cap
I. Engine Fan (Out of View)
J. Automatic Transmission Dipstick
K. Power Steering Fluid Reservoir
L. Brake Fluid Reservoir
M. Auxiliary Battery
N. Underhood Fuse Block
O. Windshield Washer Fluid Reservoir
P. Remote Negative (-) Terminal



United States Van models Shown, Canada Similar

A. Battery
B. Coolant Surge Tank and Pressure Cap
C. Automatic Transmission Dipstick
D. Engine Oil Dipstick
E. Engine Fan (Out of View)
F. Engine Oil Fill Cap
G. Engine Air Cleaner/Filter
H. Air Cleaner/Filter Restriction Indicator
I. Power Steering Fluid Reservoir
J. Brake Fluid Reservoir
K. Windshield Washer Fluid Reservoir

Engine Oil

To ensure proper engine performance and long life, careful attention must be paid to engine oil. Following these simple, but important steps will help protect your investment:

- Always use engine oil approved to the proper specification and of the proper viscosity grade. See “Selecting the Right Engine Oil” in this section.
- Check the engine oil level regularly and maintain the proper oil level. See “Checking Engine Oil” and “When to Add Engine Oil” in this section.
- Change the engine oil at the appropriate time. See *Engine Oil Life System on page 10-10*.
- Always dispose of engine oil properly. See “What to Do with Used Oil” in this section.

Checking Engine Oil

It is a good idea to check the engine oil level at each fuel fill. In order to get an accurate reading, the oil must be warm, at normal operating temperature, and the vehicle must be on level ground. The engine oil dipstick handle is a yellow loop. See *Engine Compartment Overview on page 10-4* for the location of the engine oil dipstick.

Obtaining an accurate oil level reading is essential:

1. Turn off the engine and allow at least five minutes for the oil to drain back into the oil pan. With a cool engine, allow 30 minutes. Checking the oil level too soon after engine shutoff will not provide an accurate oil level reading.
2. Pull out the dipstick and clean it with a paper towel or a cloth, then push it back in all the way. Remove it again, keeping the tip down.

When to Add Engine Oil

If the oil is below the cross-hatched area at the tip of the dipstick, add 1 L (1 qt) of the recommended oil and then recheck the level. See "Selecting the Right Engine Oil" in this section for an explanation of what kind of oil to use. For engine oil crankcase capacity, see *Capacities and Specifications on page 12-2*.

Notice: **Do not add too much oil. Oil levels above or below the acceptable operating range shown on the dipstick are harmful to the engine. If you find that you have an oil level above the operating range, i.e., the engine has so much oil that the oil level gets above the cross-hatched area that shows the proper operating range, the engine could be damaged. You should drain out the excess oil or limit driving of the vehicle and seek a service professional to remove the excess amount of oil.**

See *Engine Compartment Overview on page 10-4* for the location of the engine oil fill cap.

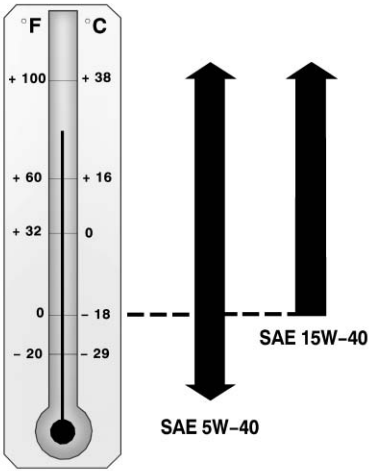
Be sure to add enough oil to put the level somewhere in the proper operating range. Push the dipstick all the way back in when through.

Selecting the Right Engine Oil

Look for three things:

- CJ-4

  Oils designated as API CJ-4 are required for the vehicle. The CJ-4 designation can appear either alone or in combination with other American Petroleum Institute (API) designations, such as API CJ-4/SL. These letters show API levels of quality.



- SAE 15W-40

  SAE 15W-40 is best for the vehicle. When it is very cold, below −18°C (0°F), use

SAE 5W-40 to improve cold starting. These numbers on the oil container show its viscosity, or thickness. Do not use other viscosity oils such as SAE 10W-30, SAE 10W-40, or SAE 20W-50.

- American Petroleum Institute (API) symbol

This doughnut-shaped logo (symbol) is used on most oil containers to help you select the correct oil. It means that the oil has been certified by the American Petroleum Institute. Look for this on the oil container, and use only those oils that display this logo.

Notice: **Use only engine oils that have the designation CJ-4 for the diesel engine. Failure to use the recommended oil can damage the DPF and result in engine damage not covered by the vehicle warranty.**

Engine Oil Additives/Engine Oil Flushes

Do not add anything to the oil. The recommended oils with the API service symbol are all that is needed for good performance and engine protection.

Engine oil system flushes are not recommended and could cause engine damage not covered by the vehicle warranty.

What to Do with Used Oil

Used engine oil contains certain elements that can be unhealthy for your skin and could even cause cancer. Do not let used oil stay on your skin for very long. Clean your skin and nails with soap and water, or a good hand cleaner. Wash or properly dispose of clothing or rags containing used engine oil. See the manufacturer's warnings about the use and disposal of oil products.

Used oil can be a threat to the environment. If you change your own oil, be sure to drain all the oil from the filter before disposal. Never dispose of oil by putting it in the trash or pouring it on the ground, into sewers, or into streams or bodies of water. Recycle it by taking it to a place that collects used oil.

Engine Oil Life System

When to Change Engine Oil

This vehicle has a computer system that indicates when to change the engine oil and filter. This is based on engine timing, engine load, and engine temperature, and not on mileage. Based on driving conditions, the mileage at which an engine oil change is indicated can vary considerably. For the oil life system to work properly, the system must be reset every time the oil is changed.

When the system has calculated that oil life has been diminished, it indicates that an oil change is necessary. A CHANGE ENGINE OIL SOON message comes on. Change the oil as soon as possible within the next 1 000 km (600 mi). It is possible that, if driving under the best conditions, the oil life system might indicate that an oil change is not necessary for up to a year. The engine oil and filter must be changed at least once a year and, at this time, the system must be reset. Your dealer has trained service people who will perform this work and reset the system. It is also important to check the oil regularly over the course of an oil drain interval and keep it at the proper level.

If the system is ever reset accidentally, the oil must be changed at 5 000 km (3,000 mi) since the last oil change. Remember to reset the oil life system whenever the oil is changed.

How to Reset the Engine Oil Life System

Reset the system whenever the engine oil is changed so that the system can calculate the next engine oil change.

To reset the Engine Oil Life System on van models:

1. Display the OIL LIFE REMAINING on the DIC.
2. Press and hold the SET/RESET button on the DIC for more than five seconds. The oil life will change to 100%.

To reset the Engine Oil Life System on most pickup models:

1. Display the OIL LIFE REMAINING on the DIC. If the vehicle does not have DIC buttons, the vehicle must be in P (Park) to access this display.
2. Press and hold the SET/RESET button on the DIC, or the trip odometer reset stem if the vehicle does not have DIC buttons, for more than five seconds. The oil life will change to 100%.

On all models, the Engine Oil Life System can be reset as follows:

1. Turn the ignition to ON/RUN with the engine off
2. Fully press the accelerator pedal slowly three times within five seconds.
3. Display the OIL LIFE REMAINING on the DIC. If the display shows 100%, the system is reset.
4. Turn the key to LOCK/OFF.

If the CHANGE ENGINE OIL SOON message comes back on when the vehicle is started, the engine oil life system has not reset. Repeat the procedure.

Automatic Transmission Fluid

When to Check and Change (Pickup Models)

Change the fluid and filter at the intervals listed. See *Scheduled Maintenance on page 11-2*.

And be sure to use the transmission fluid listed in *Recommended Fluids and Lubricants on page 11-8*.

How to Check

Because this operation can be a little difficult, the decision may be made to have this done at the dealership service department.

If the decision is made to perform this operation, be sure to follow all the instructions here, or a false reading on the dipstick could result.

Notice: **Too much or too little fluid can damage the transmission. Too much can mean that some of the fluid could come out and fall on hot engine parts or exhaust system parts, starting a fire. Too little fluid could cause the transmission to overheat. Be sure to get an accurate reading if checking the transmission fluid.**

Wait at least 30 minutes before checking the transmission fluid level if the vehicle has been driven:

- When outside temperatures are above 32°C (90°F).
- At high speed for quite a while.
- In heavy traffic — especially in hot weather.
- While pulling a trailer.

Checking the Fluid Level

Prepare the vehicle as follows:

- Park the vehicle on a level place. Keep the engine running.
- With the parking brake applied, place the shift lever in P (Park).
- With foot on the brake pedal, run the engine for at least one minute and shift to D (Drive). Then shift to N (Neutral) and then R (Reverse) to fill the hydraulic system. Then, put the shift lever in P (Park).
- Allow the engine to run at idle (500 – 800 rpm). Slowly release the brake pedal.

Then, without shutting off the engine, follow these steps:

Cold Check Procedure

The purpose of the cold check is to determine if the transmission has enough fluid to be operated safely until a hot check can be made. The fluid level rises as fluid temperature increases. DO NOT fill above the COLD CHECK band if the transmission fluid is below normal operating temperatures.

1. Pull out the dipstick and wipe it with a clean rag or paper towel. The transmission dipstick is located near the center of the engine compartment. See *Engine Compartment Overview on page 10-4* for more information on location.
2. Push it back in all the way, wait 3 seconds and then pull it back out again.
3. Check the fluid level reading. Repeat the check procedure to verify the reading.
4. If the fluid level is within the COLD CHECK band, the transmission may be operated until the fluid is hot enough to perform a hot check. If the fluid level is not within the COLD CHECK band, add or drain fluid as necessary to bring the level into the middle of the COLD CHECK band.
5. Perform a hot check at the first opportunity after the normal operating temperature of 71°C (160°F) to 93°C (200°F) is reached.
6. If the fluid level is in the acceptable range, push the dipstick back in all the way.

Hot Check Procedure

The fluid must be hot to ensure an accurate check. The fluid level rises as temperature increases.

1. Operate the transmission in D (Drive) until the normal operating temperature of 71°C (160°F) to 93°C (200°F) is reached.
2. Pull out the dipstick and wipe it with a clean rag or paper towel.
3. Push it back in all the way, wait three seconds and then pull it back out again. Repeat the check procedure to verify the reading.

4. Safe operating level is within the HOT RUN band on the dipstick. The width of the HOT RUN band represents approximately 1.0 liter (1.06 quart) of fluid at normal operating temperature.
5. If the fluid level is not within the HOT RUN band, add or drain fluid as necessary to bring the fluid level to within the HOT RUN band.
6. If the fluid level is in the acceptable range, push the dipstick back in all the way.

Consistency of Readings

Always check the fluid level at least twice using the procedures described previously. Consistency is important to maintaining proper fluid level. If inconsistent readings persist, check the transmission breather to be sure it is clean and unclogged. If readings are still inconsistent, contact the dealer.

How to Add Fluid

In cold operation, Allison recommends using Synthetic Transmission Fluid approved to Allison Transmission specification TES-295 in areas where the minimum ambient temperatures are below −40°C (−40°F).

Refer to the Maintenance Schedule to determine what kind of transmission fluid to use. See *Recommended Fluids and Lubricants on page 11-8*.

Add fluid only after checking the transmission fluid while it is hot. A cold check is used only as a reference. If the fluid level is low, add only enough of the proper fluid to bring the level up to the HOT area for a hot check. It doesn't take much fluid, generally less than 0.5 L (1 pint). Do not overfill.

Notice: **Use of the incorrect automatic transmission fluid may damage the vehicle, and the damages may not be covered by the vehicle warranty. Always use the automatic transmission fluid listed in *Recommended Fluids and Lubricants on page 11-8*.**

- After adding fluid, recheck the fluid level as described under “How to Check.”
- When the correct fluid level is obtained, push the dipstick back in all the way.

When to Check and Change (Van Models)

Change the fluid and filter at the intervals listed. See *Scheduled Maintenance on page 11-2*.

And be sure to use the transmission fluid listed in “Recommended Fluids and Lubricants”. See *Recommended Fluids and Lubricants on page 11-8* for more information.

How to Check

Because this operation can be a little difficult, the decision may be made to have this done at the dealership service department.

If the decision is made to perform this operation, be sure to follow all the instructions here, or a false reading on the dipstick could result.

Notice: **Too much or too little fluid can damage the transmission. Too much can mean that some of the fluid could come out and fall on hot engine parts or exhaust system parts, starting a fire. Too little fluid could cause the transmission to overheat. Be sure to get an accurate reading if checking the transmission fluid.**

Wait at least 30 minutes before checking the transmission fluid level if the vehicle has been driven:

- When outside temperatures are above 32° C (90°F).
- At high speed for quite a while.
- In heavy traffic — especially in hot weather.
- While pulling a trailer.

To get the right reading, the fluid should be at normal operating temperature, which is 82°C to 93°C (180°F to 200°F). Get the vehicle warmed up by driving about 24 km (15 miles) when outside temperatures are above 10°C (50°F). If it is colder than 10°C (50°F), drive the vehicle until the engine temperature gauge moves and then remains steady for 10 minutes.

A cold check can be made after the vehicle has been sitting for eight hours or more with the engine off, but this is used only as a reference. Let the engine run at idle for five minutes if outside temperatures are 10°C (50°F) or more. If it is colder than 10°C (50°F), the engine may have to idle longer. Should the fluid level be low during this cold check, the fluid must be checked when hot before adding fluid.

Checking the fluid hot will give you a more accurate reading of the fluid level.

Checking the Fluid Level

Prepare the vehicle as follows:

- Park the vehicle on a level place. Keep the engine running.
- With the parking brake applied, place the shift lever in P (Park).
- With foot on the brake pedal, move the shift lever through each gear range, pausing for about three seconds in each range. Then, position the shift lever in P (Park).
- Let the engine run at idle for three minutes or more.

Then, without shutting off the engine, follow these steps:

The transmission dipstick is located near the center of the engine compartment and will be labeled with the graphic shown.

See *Engine Compartment Overview on page 10-4* for more information on location.

1. Flip the handle up and then pull out the dipstick and wipe it with a clean rag or paper towel.
2. Push it back in all the way, wait 3 seconds and then pull it back out again.

Check both sides of the dipstick, and read the lower level. The fluid level must be in the COLD area for a cold check or in the HOT or cross-hatched area for a hot check. Be sure to keep the dipstick pointed down to get an accurate reading.

3. If the fluid level is in the acceptable range, push the dipstick in all the way, then flip the handle down to lock the dipstick in place.

What Transmission Fluid to Use (Allison Transmission Only)

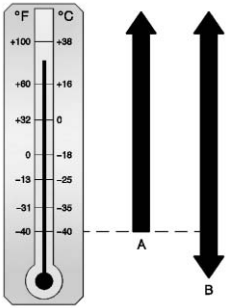
Cold Operation

When temperatures are very cold, the transmission will prevent certain operations to protect against damage. The Chart below shows shift range availability based on transmission oil temperatures:

- All shift ranges available at −25°C (−13°F) or above.
- 2 (Second) and 3 (Third) shift ranges only at −35°C (−31°F) to −25°C (−13°F).
- 2 (Second) shift range only at −35°C (−31°F) or lower.

Torque converter clutch operation will also be prevented when air or transmission oil temperatures are below certain levels.

Transmission shifting might be firmer with a cold transmission. This difference in shift quality is normal.



A. For areas where ambient temperatures stay above −40°C (−40°F), regular transmission fluid can be used. See *Recommended Fluids and Lubricants on page 11-8*.

B. For areas where ambient temperatures fall below −40°C (−40°F), synthetic transmission fluid approved to Allison Transmission Specification should be used. See *Recommended Fluids and Lubricants on page 11-8*. The synthetic transmission fluid can be used for all temperature ranges.

How to Add Fluid

Refer to the Maintenance Schedule to determine what kind of transmission fluid to use. See *Recommended Fluids and Lubricants on page 11-8*.

Using a funnel, add fluid down the transmission dipstick tube only after checking the transmission fluid while it is hot. A cold check is used only as a reference. If the fluid level is low, add only enough of the proper fluid to bring the level up to the HOT area for a hot check.

It does not take much fluid, generally less than 0.5 L (1 pint). Do not overfill.

Notice: **Use of the incorrect automatic transmission fluid may damage the vehicle, and the damages may not be covered by the vehicle warranty. Always use the automatic transmission fluid listed in *Recommended Fluids and Lubricants on page 11-8*.**

- After adding fluid, recheck the fluid level as described under “How to Check” earlier in this section.
- When the correct fluid level is obtained, push the dipstick back in all the way. Then flip the handle down to lock the dipstick in place.

Engine Air Cleaner/Filter

Pickup Models

The air cleaner/filter assembly may have an air cleaner/filter restriction indicator that shows when the engine air cleaner/filter is dirty and needs to be serviced.

The air cleaner/filter restriction indicator is located on the air cleaner box.

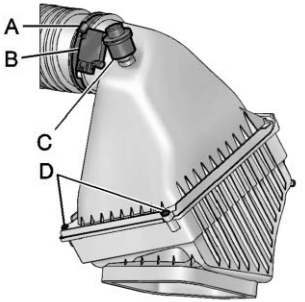
When to Inspect

Inspect the air cleaner/filter every 25 000 km (15,000 miles) and replace the filter if necessary.

How to Inspect

When the restriction indicator turns black, or is in the red/orange “change” zone, replace the filter and reset the restriction indicator. The air cleaner/filter assembly is located on the front corner of the engine compartment on the passenger's side of the vehicle.

To inspect and replace the filter and reset the restriction indicator:



A. Clamp

B. Cover Electrical Connector

C. Restriction Indicator

D. Cover Screws

1. Disconnect the harness connector from the air cleaner cover connector (B).
2. Loosen the screw on the clamp (A) holding the air outlet duct in place. Do not remove the clamp. Move the air duct aside.

3. Remove the two air cleaner housing cover screws (D).
4. Raise the air cleaner housing cover and remove the air cleaner/filter from the air cleaner housing. Care should be taken to dislodge as little dirt as possible.
5. Clean the filter sealing surface and the housing.
6. Install the new engine air cleaner/filter.
7. Lower the air cleaner housing cover and secure with the two screws.
8. Install the air duct and tighten the screw on the clamp to secure to the air cleaner housing.
9. Install the harness electrical connector.
10. Reset the air cleaner/filter restriction indicator (C), if equipped, by pressing the top button on the indicator.

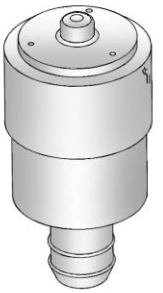
See *Scheduled Maintenance on page 11-2* to determine when to replace the engine air cleaner/filter.

⚠ WARNING

Operating the engine with the air cleaner/filter off can cause you or others to be burned. The air cleaner not only cleans the air; it helps to stop flames if the engine backfires. Use caution when working on the engine and do not drive with the air cleaner/filter off.

Notice: **If the air cleaner/filter is off, dirt can easily get into the engine, which could damage it. Always have the air cleaner/filter in place when you are driving.**

Van Models



The air cleaner/filter assembly may have an air cleaner/filter restriction indicator that shows when the engine air cleaner/filter is dirty and needs to be serviced.

The air cleaner/filter restriction indicator is located on the air cleaner resonator.

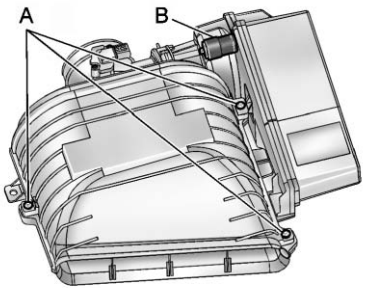
When to Inspect

See *Scheduled Maintenance on page 11-2* for more information.

How to Inspect

When the restriction indicator is in the red/orange “change” zone, replace the filter and reset the restriction indicator. The air cleaner/filter assembly is located at the front of the engine compartment.

To inspect and replace the filter and reset the restriction indicator:



A. Cover Screws

B. Restriction Indicator

1. Loosen the screws (A) on the cover of the housing and lift up the cover.
2. Remove the air cleaner/filter from the housing. Care should be taken to dislodge as little dirt as possible.
3. Clean the filter sealing surface and the housing.
4. Install the new engine air cleaner/filter.
5. Reinstall the cover and tighten the screws.
6. Reset the air cleaner/filter restriction indicator (B), if equipped, by pressing the top button on the indicator.

See *Scheduled Maintenance on page 11-2* to determine when to replace the engine air cleaner/filter.

⚠ WARNING

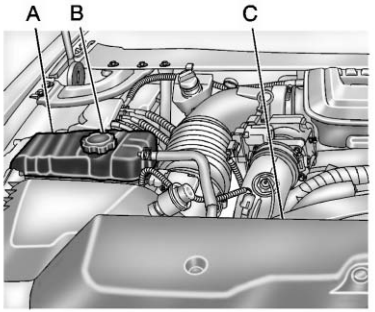
Operating the engine with the air cleaner/filter off can cause you or others to be burned. The air cleaner not only cleans the air; it helps to stop flames if the engine backfires. Use caution when working on the engine and do not drive with the air cleaner/filter off.

Notice: **If the air cleaner/filter is off, dirt can easily get into the engine, which could damage it. Always have the air cleaner/filter in place when you are driving.**

Cooling System

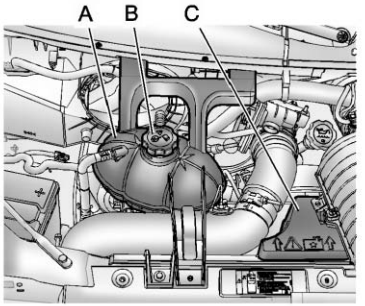
The cooling system allows the engine to maintain the correct working temperature.

Pickup Models



A. Coolant Surge Tank
B. Coolant Surge Tank Pressure Cap
C. Engine Cooling Fan (Out of View)

Van Models



A. Coolant Surge Tank
B. Coolant Surge Tank Pressure Cap
C. Engine Cooling Fan (Out of View)

⚠ WARNING

Heater and radiator hoses, and other engine parts, can be very hot. Do not touch them. If you do, you can be burned.

Do not run the engine if there is a leak. If you run the engine, it could lose all coolant. That could cause an engine fire, and you could be burned. Get any leak fixed before you drive the vehicle.

Notice: **Using coolant other than DEX-COOL® can cause premature engine, heater core, or radiator corrosion. In addition, the engine coolant could require changing sooner, at 50 000 km (30,000 mi) or 24 months, whichever occurs first. Any repairs would not be covered by the vehicle warranty. Always use DEX-COOL (silicate-free) coolant in the vehicle.**

Engine Coolant

The cooling system in the vehicle is filled with DEX-COOL® engine coolant. This coolant is designed to remain in the vehicle for 5 years or 240 000 km (150,000 mi), whichever occurs first, if you add only DEX-COOL extended life coolant.

The following explains the cooling system and how to add coolant when it is low. If there is a problem with engine overheating, see *Engine Overheating on page 10-25*.

A 50/50 mixture of clean, drinkable water and DEX-COOL coolant will:

- Give freezing protection down to −37°C (−34°F)
- Give boiling protection up to 129°C (265°F)
- Protect against rust and corrosion
- Help keep the proper engine temperature
- Let the warning lights and gauges work as they should

Notice: **Using coolant other than DEX-COOL may cause premature engine, heater core, radiator and fuel operated heater (van models only) corrosion. In addition, the engine coolant may require changing sooner, at 50 000 km (30,000 mi) or 24 months, whichever occurs first. Any repairs would not be covered by the vehicle warranty. Always use DEX-COOL (silicate-free) coolant in the vehicle.**

What to Use

Use a 50/50 mixture of clean, drinkable water and DEX-COOL coolant which will not damage aluminum parts. If using this mixture, nothing else needs to be added.

⚠ WARNING

Adding only plain water or some other liquid to the cooling system can be dangerous. Plain water and other liquids, can boil before the proper coolant mixture will. The vehicle's coolant warning system is set for the proper coolant mixture. With plain water or the wrong mixture, the engine could get too hot but you would not get the overheat warning. The engine could catch fire and you or others could be burned. Use a 50/50 mixture of clean, drinkable water and DEX-COOL coolant.

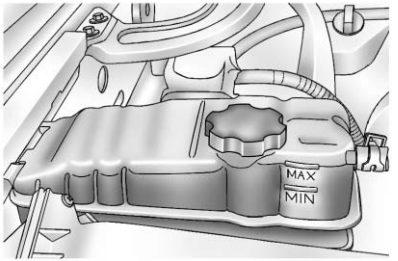
Notice: **If an improper coolant mixture is used, the engine could overheat and be badly damaged. The repair cost would not be covered by the vehicle warranty. Too much water in the mixture can freeze and crack the engine, radiator, heater core, and other parts.**

If coolant has to be added more than four times a year, have the dealer check the vehicle cooling system.

Notice: **If you use extra inhibitors and/or additives in your vehicle's cooling system, you could damage your vehicle. Use only the proper mixture of the engine coolant listed in this manual for the cooling system. See *Recommended Fluids and Lubricants on page 11-8* for more information.**

Never dispose of engine coolant by putting it in the trash, pouring it on the ground, or into sewers, streams, or bodies of water. Have the coolant changed by an authorized service center, familiar with legal requirements regarding used coolant disposal. This will help protect the environment and your health.

Checking Coolant (Pickup Models)



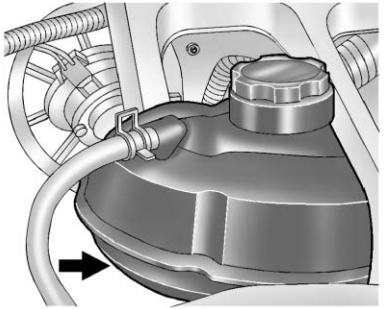
The coolant surge tank is located in the engine compartment on the passenger side of the vehicle. See *Engine Compartment Overview on page 10-4* for more information on its location.

⚠ WARNING

Turning the surge tank pressure cap when the engine and radiator are hot can allow steam and scalding liquids to blow out and burn you badly. Never turn the surge tank pressure cap — even a little — when the engine and radiator are hot.

The vehicle must be on a level surface. When the engine is cold, the coolant level should be between the MIN and MAX marks.

Checking Coolant (Van Models)



The surge tank is located near the center of the engine compartment. See *Engine Compartment Overview on page 10-4* for more information on its location.

⚠ WARNING

Turning the surge tank pressure cap when the engine and radiator are hot can allow steam and scalding liquids to blow out and burn you badly. Never turn the surge tank pressure cap — even a little — when the engine and radiator are hot.

The vehicle must be on a level surface. When the engine is cold, the coolant level should be at the COLD FILL mark.

Adding Coolant (Pickup and Van Models)

If more coolant is needed, add the proper DEX-COOL coolant mixture at the surge tank, but be careful not to spill it.

⚠ WARNING

You can be burned if you spill coolant on hot engine parts. Coolant contains ethylene glycol and it will burn if the engine parts are hot enough. Do not spill coolant on a hot engine.

Notice: **This vehicle has a specific coolant fill procedure. Failure to follow this procedure could cause the engine to overheat and be severely damaged.**

⚠ WARNING

Steam and scalding liquids from a hot cooling system can blow out and burn you badly. They are under pressure, and if you turn the coolant surge tank pressure cap — even a little — they can come out at high speed. Never turn the cap when the cooling system, including the coolant surge tank pressure cap, is hot. Wait for the cooling system and coolant surge tank pressure cap to cool if you ever have to turn the pressure cap.

If no coolant is visible in the surge tank, add coolant as follows:

1. Remove the coolant surge tank pressure cap when the cooling system, including the coolant surge tank pressure cap and upper radiator hose, is no longer hot.

   Turn the pressure cap slowly counterclockwise about one full turn. If a hiss is heard, wait for that to stop. A hiss means there is still some pressure left.
2. Keep turning the pressure cap slowly, and remove it.
3. Fill the coolant surge tank with the proper mixture as follows:
   - To the MAX mark on the pickup
   - To the COLD FILL mark on the van
4. With the coolant surge tank pressure cap off, start the engine and let it run until the engine coolant temperature gauge indicates approximately 90°C (195°F).

   By this time, the coolant level inside the coolant surge tank may be lower. If the level is lower, add more of the proper mixture to the coolant surge tank until the level reaches the proper level.

5. Replace the pressure cap. Be sure the pressure cap is hand-tight and fully seated.
6. Verify coolant level after the engine is shut off and the coolant is cold. If necessary, repeat coolant fill procedure Steps 1 through 6.

If the coolant level is still low after having followed these steps twice, have the coolant system checked a certified technician at the dealer for a possible leak.

Notice: **If the pressure cap is not tightly installed, coolant loss and possible engine damage may occur. Be sure the cap is properly and tightly secured.**

Engine Overheating

There is an engine coolant temperature gauge on the instrument panel cluster. See the owner manual for more information.

If Steam Is Coming from the Engine Compartment

⚠ WARNING

Steam from an overheated engine can burn you badly, even if you just open the hood. Stay away from the engine if you see or hear steam coming from it. Just turn it off and get everyone away from the vehicle until it cools down. Wait until there is no sign of steam or coolant before you open the hood.

If you keep driving when the engine is overheated, the liquids in it can catch fire. You or others could be badly burned. Stop the engine if it overheats, and get out of the vehicle until the engine is cool.

Notice: **If the engine catches fire because of being driven with no coolant, the vehicle can be badly damaged. The costly repairs would not be covered by the vehicle warranty.**

If No Steam Is Coming from the Engine Compartment

The ENGINE OVERHEATED STOP ENGINE, or ENGINE OVERHEATED IDLE ENGINE Driver Information Center (DIC) message, along with a low coolant condition can indicate a serious problem.

If there is an engine overheat warning and the vehicle does not have a low coolant condition, and no steam is heard or seen, the problem may not be too serious. Sometimes the engine can get a little too hot when the vehicle:

- Climbs a long hill on a hot day
- Stops after high-speed driving
- Idles for long periods in traffic

- Tows a trailer. See “Driving on Grades” in the Index of the vehicle's owner manual

If the ENGINE OVERHEATED STOP ENGINE, or ENGINE OVERHEATED IDLE ENGINE Driver Information Center (DIC) message comes on with no sign of steam, try this for a minute or so:

1. In heavy traffic, let the engine idle in N (Neutral) while stopped. If it is safe to do so, pull off the road, shift to P (Park) or N (Neutral) and let the engine idle.
2. Turn on the heater to full hot at the highest fan speed and open the window as necessary.

If the vehicle no longer has the overheat warning, the vehicle can be driven. Just to be safe, drive slower for about 10 minutes. If the warning does not come back on, drive normally.

If the warning continues, pull over, stop, and park the vehicle right away.

If there is still no sign of steam and the vehicle is equipped with an engine driven cooling fan, push down the accelerator until the engine speed is about twice as fast as normal idle speed for at least five minutes while the vehicle is parked. If the warning is still there, turn off the engine and get everyone out of the vehicle until it cools down.

The decision may be made not to lift the hood, but to get service help right away.

Starter Switch Check

⚠ WARNING

When you are doing this inspection, the vehicle could move suddenly. If the vehicle moves, you or others could be injured.

1. Before starting this check, be sure there is enough room around the vehicle.
2. Firmly apply both the parking brake and the regular brake. See “Parking Brake” in the owner manual.

   Do not use the accelerator pedal, and be ready to turn off the engine immediately if it starts.
3. Try to start the engine in each gear. The vehicle should start only in P (Park) or N (Neutral). If the vehicle starts in any other position, contact your dealer for service.

Automatic Transmission Shift Lock Control Function Check

⚠ WARNING

When you are doing this inspection, the vehicle could move suddenly. If the vehicle moves, you or others could be injured.

1. Before starting this check, be sure there is enough room around the vehicle. It should be parked on a level surface.
2. Firmly apply the parking brake. See “Parking Brake” in the owner manual.

   Be ready to apply the regular brake immediately if the vehicle begins to move.
3. With the engine off, turn the ignition to ON/RUN, but do not start the engine. Without applying the regular brake, try to move the shift lever out of P (Park) with normal effort. If the shift lever moves out of P (Park), contact your dealer for service.

Ignition Transmission Lock Check

While parked, and with the parking brake set, try to turn the ignition to LOCK/OFF in each shift lever position.

- The ignition should turn to LOCK/OFF only when the shift lever is in P (Park).
- The ignition key should come out only in LOCK/OFF.

Contact your dealer if service is required.

Park Brake and P (Park) Mechanism Check

⚠ WARNING

When you are doing this check, the vehicle could begin to move. You or others could be injured and property could be damaged. Make sure there is room in front of the vehicle in case it begins to roll. Be ready to apply the regular brake at once should the vehicle begin to move.

Park on a fairly steep hill, with the vehicle facing downhill. Keeping your foot on the regular brake, set the parking brake.

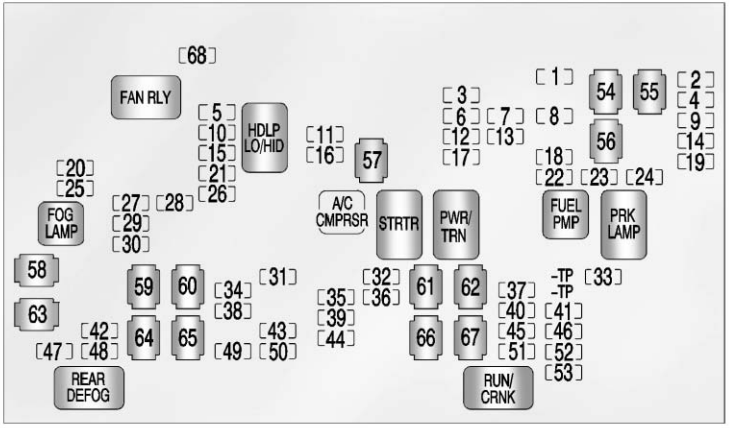
- To check the parking brake's holding ability: With the engine running and the transmission in N (Neutral), slowly remove foot pressure from the regular brake pedal. Do this until the vehicle is held by the parking brake only.

- To check the P (Park) mechanism's holding ability: With the engine running, shift to P (Park). Then release the parking brake followed by the regular brake.

Contact your dealer if service is required.

Electrical System

Engine Compartment Fuse Block



Pickup Models

The underhood fuse block is located in the engine compartment, on the driver side of the vehicle. Lift the cover to access the fuse block.

For vans equipped with a Duramax engine, see “Engine Compartment Fuse Block” in the vehicle owner manual.

To remove fuses, hold the end of the fuse between your thumb and index finger and pull straight out.

The vehicle may not be equipped with all of the fuses and relays shown.

Fuses	Usage
1	Electronic Stability Suspension Control, Automatic Level Control Exhaust
2	Left Trailer Stop/ Turn Lamp
3	Engine Controls
4	Right Trailer Stop/ Turn Lamp
5	Front Washer
6	Fuel Heater
7	Transmission Control Module (Battery)
8	Anti-lock Brakes System 2
9	Trailer Back-up Lamps
10	Left Low-Beam Headlamp
11	Engine Control Module (Battery)
12	Diesel Electronic Control Module
13	Transmission Ignition 1
14	Vehicle Back-up Lamps
15	Right Low-Beam Headlamp
16	Air Conditioning Compressor
17	Electronic Control Module/Throttle Control
18	Fuel Pump
19	Integrated Trailer Brake Control
20	Headlamp Washer
21	Rear Windshield Washer
22	Trailer Park Lamps
23	Left Park Lamps
24	Right Park Lamps
25	Fog Lamps
26	Horn
27	Right High-Beam Headlamp
28	Daytime Running Lamps
29	Left High-Beam Headlamp
30	Daytime Running Lamp 2
31	Sunroof

Fuses	Usage
32	Key Ignition System, Theft Deterrent System
33	Windshield Wiper
34	SEO B2 Upfitter Usage (Battery)
35	Electric Adjustable Pedals
36	Climate Controls (Battery)
37	Airbag System (Ignition)
38	Amplifier
39	Audio System
40	Miscellaneous (Ignition), Cruise Control
41	Tailgate Open/Close Assist

Fuses	Usage
42	Airbag System (Battery)
43	Instrument Panel Cluster
44	Power Take-Off
45	Auxiliary Climate Control (Ignition), Compass and Temperature Mirror
46	Center High-Mounted Stoplamp (CHMSL)
47	Rear Defogger
48	Heated Mirrors
49	SEO B1 Upfitter Usage (Battery)
50	Cigarette Lighter, Auxiliary Power Outlet
51	Automatic Level Control Compressor Relay, SEO Upfitter Usage

Fuses	Usage
52	Climate Controls (Ignition)
53	Engine Control Module, Secondary Fuel Pump (Ignition)
68	Fan

J-Case Fuses	Usage
54	Automatic Level Control Compressor
55	Heavy Duty Anti-lock Brake System
56	Anti-lock Brake System 1
57	Starter
58	Stud 2 (Trailer Brakes)
59	Left Bussed Electrical Center 1

J-Case Fuses	Usage
60	Electric Running Boards
61	Heated Windshield Washer System
62	Four-Wheel Drive System
63	Stud 1 (Trailer Connector Battery Power)
64	Mid-Bussed Electrical Center 1
65	Climate Control Blower
66	Tailgate Open/Close Assist
67	Left Bussed Electrical Center 2

Relays	Usage
FAN RLY	Fan Relay
HDLP LO/HID	Low-Beam Headlamp
FOG LAMP	Front Fog Lamps
A/C CMPRSR	Air Conditioning Compressor
STRTR	Starter
PWR/TRN	Powertrain
FUEL PMP	Fuel Pump

Relays	Usage
PRK LAMP	Parking Lamps
REAR DEFOG	Rear Defogger
RUN/ CRNK	Switched Power

✍ NOTES

Service and Maintenance

General Information
General Information 11-1

Scheduled Maintenance
Scheduled Maintenance 11-2

Recommended Fluids, Lubricants, and Parts
Recommended Fluids and Lubricants 11-8
Maintenance Replacement Parts 11-11

Maintenance Records
Maintenance Records 11-12

General Information

Notice: **Maintenance intervals, checks, inspections, recommended fluids, and lubricants are necessary to keep this vehicle in good working condition. Damage caused by failure to follow scheduled maintenance might not be covered by the vehicle warranty.**

Proper vehicle maintenance helps to keep the vehicle in good working condition, improves fuel economy, and reduces vehicle emissions for better air quality.

Because of all the different ways people use vehicles, maintenance needs vary. The vehicle might need more frequent checks and services. Please read the information under Scheduled Maintenance. To keep the vehicle in good condition, see your dealer.

The maintenance schedule is for vehicles that:

- carry passengers and cargo within recommended limits on the Tire and Loading Information label. See “Loading the Vehicle” in the owner manual.
- are driven on reasonable road surfaces within legal driving limits.

- are driven off-road in the recommended manner, pickup models only. See “Off-Road Driving” in the owner manual.
- use the recommended fuel. See *Fuel for Diesel Engines on page 9-16*.

⚠ WARNING

Performing maintenance work on a vehicle can be dangerous. In trying to do some jobs, you can be seriously injured. Do your own maintenance work only if you have the required know-how and the proper tools and equipment for the job. If you have any doubt, see your dealer to have a qualified technician do the work. See “Doing Your Own Service Work” in the owner manual.

At your General Motors dealer, you can be certain that you will receive the highest level of service available. Your dealer has specially trained service technicians, uses genuine GM replacement parts, as well as, up-to-date tools and equipment to ensure fast and accurate diagnostics.

The proper replacement parts, fluids, and lubricants to use are listed in *Recommended Fluids and Lubricants on page 11-8* and *Maintenance Replacement Parts on page 11-11*. We recommend the use of genuine parts from your dealer.

Rotation of New Tires

To maintain ride, handling, and performance of the vehicle, it is important that the first rotation service for new tires be performed. Tires should be rotated every 12 000 km/7,500 miles. See “Tire Inspection and Rotation” in the owner manual.

Scheduled Maintenance

When the Change Engine Oil Soon Message Displays

Change engine oil and filter. See *Engine Oil on page 10-7*. *An Emission Control Service.*

When the CHANGE ENGINE OIL SOON message displays in the Driver Information Center (DIC), service is required for the vehicle as soon as possible, within the next 1 000 km/600 miles. If driving under the best conditions, the engine oil life system might not indicate the need for vehicle service for more than a year. The engine oil and filter must be changed at least once a year and the oil life system must be reset. Your dealer has trained service technicians who will perform this work and reset the system.

If the engine oil life system is reset accidentally, service the vehicle within 5 000 km/3,000 miles since the last service. Reset the oil life system whenever the oil is changed. See *Engine Oil Life System on page 10-10*.

Every Engine Oil Change

- Change engine oil and filter. Reset oil life system. See *Engine Oil on page 10-7* and *Engine Oil Life System on page 10-10*. *An Emission Control Service.*
- Add diesel exhaust fluid. See *Diesel Exhaust Fluid on page 9-12*.
- Engine coolant level check. See *Engine Coolant on page 10-21*.
- Engine cooling system inspection. Visual inspection of hoses, pipes, fittings, and clamps and replacement, if needed.
- Windshield washer fluid level check. See “Washer Fluid” in the owner manual.
- Windshield wiper blade inspection for wear, cracking, or contamination and windshield and wiper blade cleaning, if contaminated. See “Exterior Care” in the owner manual. Worn or damaged wiper blade replacement. See “Wiper Blade Replacement” in the owner manual.
- Tire inflation pressures check. See “Tire Pressure” in the owner manual.
- Tire wear inspection. See “Tire Inspection” in the owner manual.
- Rotate tires if necessary. See “Tire Rotation” in the owner manual.
- Fluids visual leak check (or every 12 months, whichever occurs first). A leak in any system must be repaired and the fluid level checked.
- Engine air cleaner filter inspection. See *Engine Air Cleaner/Filter on page 10-17*.
- Brake system inspection (or every 12 months, whichever occurs first).
- Steering and suspension inspection. Visually inspect front and rear suspension and steering system for damaged, loose, or missing parts, signs of wear or lack of lubrication. Inspect power steering lines and hoses for proper hook-up, binding, leaks, cracks, chafing, etc. Pickup models: Visually check constant velocity joints, rubber boots, and axle seals for leaks.

- Lubricate the front suspension, steering linkage, rear driveline center splines (van models), and parking brake cable guides. Control arm ball joints on pickup models require lubrication but should not be lubricated unless their temperature is −12°C (10°F) or higher, or they could be damaged. Vehicles used under severe commercial operating conditions require lubrication on a regular basis every 5 000 km/3,000 miles.
- Body component lubrication. Lubricate all key lock cylinders, body door hinges, hood latch assembly, secondary latch, pivots, spring anchor, release pawl, fuel door hinge, locks, latches, and any folding or moving seat hardware. Pickup models: Lubricate tailgate hinges, tailgate linkage, tailgate handle pivot points, and latch bolt. Van models: Lubricate hood hinges and rear compartment hinges. See *Recommended Fluids and Lubricants on page 11-8*. More frequent lubrication may be required when the vehicle is exposed to a corrosive environment. Applying silicone grease on weatherstrips with a clean cloth makes them last longer, seal better, and not stick or squeak.
- Restraint system component check. See “Safety System Check” in the owner manual.
- Fuel system inspection for damage or leaks.
- Exhaust system, including DPF pressure lines, and nearby heat shields inspection for loose or damaged components. Check to be sure that mud or dirt is not caked on the exhaust system, especially in the area of the diesel particulate filter and tailpipe. Clean the area as needed. See *Diesel Particulate Filter (Exhaust Filter) on page 9-10*. At high mileages, the DPF becomes loaded with ash. This is normal. When the amount of ash loading is high, see your dealer for DPF cleaning or replacement.
- For vehicles with Allison Transmission® only: At the first engine oil change only, replace external transmission filter.
- Vans with GVWR above 4 536 kg (10,000 lbs) and all pickups: Shields inspection for damage or looseness. Adjust or replace as required. This is a Noise Emission Control Service. Applicable to vehicles sold in the United States and recommended for vehicles sold in Canada.
- Air intake system check. Check the air intake system installation to assure that gaskets are properly sealed and that all hose connections, fasteners, and other components are tight. Also check to be sure that the air cleaner housing is properly seated and the cover fits tightly.

Tighten connections and fasteners or replace damaged parts as necessary. This is a Noise Emission Control Service. Applicable to vehicles sold in the United States and recommended for vehicles sold in Canada.

- Fuel filter service. *An Emission Control Service.*

  This vehicle has a CHANGE FUEL FILTER message in the Driver Information Center (DIC) to tell you when to replace the fuel filter. See *Fuel System Messages on page 5-11*. Change the fuel filter a minimum of once every two years. The PERCENT FUEL FILTER LIFE REMAINING message may be used to decide if the filter should be changed during routine vehicle service.

Additional Required Services

At the First 160 km/100 Miles, 1 600 km/1,000 Miles, and 10 000 km/6,000 Miles

- For pickups with dual wheels: Check dual wheel nut torque. For proper torque, see “Capacities and Specifications” in the owner manual.

Every 12 000 km/7,500 Miles

- Rotate tires. Tires should be rotated every 12 000 km/ 7,500 miles. See “Tire Rotation” in the owner manual.

At Each Fuel Stop

- Engine oil level check. See *Engine Oil on page 10-7*.
- Engine coolant level check. See *Engine Coolant on page 10-21*.
- Windshield washer fluid level check. See “Washer Fluid” in the owner manual.

Once a Month

- Tire inflation pressures check. See “Tire Pressure” in the owner manual.
- Tire wear inspection. See “Tire Inspection” in the owner manual.
- Sunroof track and seal inspection, if equipped. See “Sunroof” in the owner manual.

Once a Year

- See “Starter Switch Check” in the owner manual.
- See “Automatic Transmission Shift Lock Control Function Check” in the owner manual.
- See “Ignition Transmission Lock Check” in the owner manual.
- See “Park Brake and P (Park) Mechanism Check” in the owner manual.
- Accelerator pedal check for damage, high effort, or binding. Replace if needed.
- Underbody flushing service.

- Hood and liftgate gas strut support service. Visually inspect gas strut for signs of wear, corrosion, cracks, loss of lubricant, or other damage. Check the hold open ability of gas strut. Replace as necessary with genuine parts from your dealer.

First Engine Oil Change After Every 40 000 km/25,000 Miles

- Pickup Models: Automatic transmission fluid and external filter change (severe service) for vehicles mainly driven in heavy city traffic in hot weather, in hilly or mountainous terrain, when frequently towing a trailer, or used for taxi, police, or delivery service. See *Automatic Transmission Fluid on page 10-11*.
- Four-wheel drive pickup models only: Transfer case fluid change (extreme duty service) for vehicles mainly driven off-road in four-wheel drive. Vehicles used for farming, mining, forestry, Department of Natural Resources (DNR), and snow plowing occupations meet this definition. Check vent hose at transfer case for kinks and proper installation. Check to be sure vent hose is unobstructed, clear, and free of debris. During any maintenance, if a power washer is used to clean mud and dirt from the underbody, care should be taken to not directly spray the transfer case output seals. High pressure water can overcome the seals and contaminate the transfer case fluid. Contaminated fluid will decrease the life of the transfer case and should be replaced.

First Engine Oil Change After Every 80 000 km/50,000 Miles

- Engine air cleaner filter replacement. See *Engine Air Cleaner/Filter on page 10-17*.
- Pickup Models: Automatic transmission fluid and filter change (normal service). See *Automatic Transmission Fluid on page 10-11*.
- Van Models: Automatic transmission fluid and filter change (severe service) for vehicles mainly driven in heavy city traffic in hot weather, in hilly or mountainous terrain, when frequently towing a trailer, or used for taxi, police, or delivery service. See *Automatic Transmission Fluid on page 10-11*.

- Four-wheel drive pickup models only: Transfer case fluid change (severe service) for vehicles mainly driven when frequently towing a trailer, or used for taxi, police, or delivery service. Check vent hose at transfer case for kinks and proper installation. Check to be sure vent hose is unobstructed, clear, and free of debris. During any maintenance, if a power washer is used to clean mud and dirt from the underbody, care should be taken to not directly spray the transfer case output seals. High pressure water can overcome the seals and contaminate the transfer case fluid. Contaminated fluid will decrease the life of the transfer case and should be replaced.

First Engine Oil Change After Every 160 000 km/100,000 Miles

- Van Models: Automatic transmission fluid and filter change (normal service). See *Automatic Transmission Fluid on page 10-11*.
- Four-wheel drive pickup models only: Transfer case fluid change (normal service). Check vent hose at transfer case for kinks and proper installation. Check to be sure vent hose is unobstructed, clear, and free of debris. During any maintenance, if a power washer is used to clean mud and dirt from the underbody, care should be taken to not directly spray the transfer case output seals. High pressure water can overcome the seals and contaminate the transfer case fluid. Contaminated fluid will decrease the life of the transfer case and should be replaced.

First Engine Oil Change After Every 240 000 km/150,000 Miles

- Engine cooling system drain, flush, and refill (or every five years, whichever occurs first). See *Engine Coolant on page 10-21*. *An Emission Control Service.*
- Engine drive belts inspection for fraying, excessive cracks, or obvious damage (or every 10 years, whichever occurs first). Replace, if needed.

Recommended Fluids, Lubricants, and Parts

Recommended Fluids and Lubricants

Fluids and lubricants identified below by name, part number, or specification can be obtained from your dealer.

Usage	Fluid/Lubricant
Engine Oil	Engine oils with the letters CJ-4 are required for your vehicle. The CJ-4 designation can appear either alone or in combination with other American Petroleum Institute (API) designations, such as API CJ-4/SL. These letters show API levels of quality. To determine the preferred viscosity for your vehicle's diesel engine, see *Engine Oil on page 10-7*.
Engine Coolant	50/50 mixture of clean, drinkable water and use only DEX-COOL Coolant. See *Engine Coolant on page 10-21*.
Hydraulic Brake System	DOT 3 Hydraulic Brake Fluid (GM Part No. 12377967, in Canada 89021320).
Diesel Exhaust Aftertreatment System	Diesel Exhaust Fluid (GM Part No. 88862659, in Canada 88862660) or diesel exhaust fluid that meets ISO 22241-1 or displays the API Diesel Exhaust Fluid Certification Mark.
Windshield Washer	Optikleen® Washer Solvent.
Van Models: Parking Brake Cable Guides	Chassis Lubricant (GM Part No. 12377985, in Canada 88901242) or lubricant meeting requirements of NLGI #2, Category LB or GC-LB.
Power Steering System	GM Power Steering Fluid (GM Part No. 89021184, in Canada 89021186).

Usage	Fluid/Lubricant
Automatic Transmission	DEXRON®-VI Automatic Transmission Fluid. Allison Transmission Only: For areas where ambient temperatures are below -40°C (-40°F) use Synthetic Transmission Fluid approved to Allison Transmission specification TES-295 (GM Part No. 12378515, in Canada 88900701).
Key Lock Cylinders	Multi-Purpose Lubricant, Superlube (GM Part No. 12346241, in Canada 10953474).
Pickup Models: Floor Shift Linkage	Lubriplate Lubricant Aerosol (GM Part No. 12346293, in Canada 992723) or lubricant meeting requirements of NLGI #2 Category LB or GC-LB.
Chassis Lubrication	Chassis Lubricant (GM Part No. 12377985, in Canada 88901242) or lubricant meeting requirements of NLGI #2, Category LB or GC-LB.
Van Models: Front Wheel Bearings	Wheel bearing lubricant meeting requirements of NLGI #2, Category GC or GC-LB (GM Part No. 1051344, in Canada 993037).
Front and Rear Axle	SAE 75W-90 Synthetic Axle Lubricant (GM Part No. 89021677, in Canada 89021678).
Transfer Case	DEXRON®-VI Automatic Transmission Fluid.
Van Models: One-Piece Propshaft Slip Yoke Spline, Two-Piece Propshaft Slip-in-Tube Spline	Spline Lubricant, Special Lubricant (GM Part No. 12345879, in Canada 10953511).
Pickup Models: Front Axle Propshaft Spline	Spline Lubricant, Special Lubricant (GM Part No. 12345879, in Canada 10953511).

Usage	Fluid/Lubricant
Pickup Models: Rear Driveline Center Spline	Chassis Lubricant (GM Part No. 12377985, in Canada 88901242) or lubricant meeting requirements of NLGI #2, Category LB or GC-LB.
Hood Hinges	Multi-Purpose Lubricant, Superlube (GM Part No. 12346241, in Canada 10953474).
Pickup Models: Body Door Hinge Pins, Tailgate Hinge and Linkage, Folding Seats, and Fuel Door Hinge	Multi-Purpose Lubricant, Superlube (GM Part No. 12346241, in Canada 10953474).
Pickup Models: Tailgate Handle Pivot Points, Hinges, Latch Bolt, and Linkage	Multi-Purpose Lubricant, Superlube (GM Part No. 12346241, in Canada 10953474).
Weatherstrip Conditioning	Weatherstrip Lubricant (GM Part No. 3634770, in Canada 10953518) or Dielectric Silicone Grease (GM Part No. 12345579, in Canada 992887).
Weatherstrip Squeaks	Synthetic Grease with Teflon, Superlube (GM Part No. 12371287, in Canada 10953437).

Maintenance Replacement Parts

Replacement parts identified below by name, part number, or specification can be obtained from your dealer.

Part	GM Part Number	ACDelco Part Number
Engine Air Cleaner/Filter		
Pickup Models	25945274	A3141C
Van Models	20815924	A3140C
Engine Fuel Filter		
Pickup Models	12633243	TP3012
Van Models (Primary and Secondary Filter Kit)	19256348	TP3013*
Engine Oil Filter	88917036	PF2232
Use only the specified filters. *Racor service kit includes primary filter, secondary filter and o-rings.		

Maintenance Records

After the scheduled services are performed, record the date, odometer reading, who performed the service, and the type of services performed in the boxes provided. Retain all maintenance receipts.

Maintenance Record

Date	Odometer Reading	Serviced By	Services Performed

Maintenance Record (cont.)

Date	Odometer Reading	Serviced By	Services Performed

Maintenance Record (cont.)

Date	Odometer Reading	Serviced By	Services Performed

Technical Data

Vehicle Data

Capacities and Specifications 12-2
Engine Drive Belt Routing . . . 12-4

Vehicle Data

Capacities and Specifications

The following approximate capacities are given in metric and English conversions. See *Recommended Fluids and Lubricants on page 11-8* for more information.

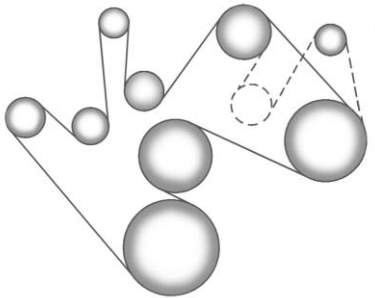
Application	Capacities	
	Metric	English
Cooling System (Pickup Models)	27.0 L	28.5 qt
Cooling System (Van Models)		
Front Heat or AC Only	20.0 L	21.2 qt
Front Heat or AC Plus Fuel Operated Heater (FOH)	20.9 L	22.1 qt
Front and Rear Heat or AC Only	21.5 L	22.7 qt
Front and Rear Heat or AC Plus Fuel Operated Heater (FOH)	22.4 L	23.7 qt
Diesel Exhaust Fluid (DEF) Tank*		
Pickup Models	20.1 L	5.3 gal
Van Models	20.1 L	5.3 gal
Engine Oil With Filter	9.5 L	10.0 qt

Application	Capacities	
	Metric	English
Transmission Fluid (Pan Removal and Filter Replacement)		
Auto 6-Speed Transmission Allison	7.0 L	7.4 qt
*Do not overfill the (DEF) tank. See *Diesel Exhaust Fluid on page 9-12*.		
All quantities are approximate. When adding, be sure to fill to the appropriate level, as recommended in this manual. Recheck fluid level after filling.		

Engine Specifications

Engine	VIN Code	Type
6.6L V8 Turbo Diesel (LGH Engine)	L	V8
6.6L V8 Turbo Diesel (LML Engine)	8	V8

Engine Drive Belt Routing



A

Accessories and Modifications 10-1
Air Cleaner/Filter, Engine 10-17
Automatic Transmission Fluid 10-11
Shift Lock Control Function Check 10-27

B

Brake Exhaust 9-15

C

Canadian Vehicle Owners ii
Capacities and Specifications 12-2
Check Engine Light 5-6
Ignition Transmission Lock 10-27
Cluster, Instrument 5-2
Cold Weather Operation 9-25
Coolant Engine 10-21
Cooling System 10-20
Engine Messages 5-11
Covers Winter 9-5

D

Diesel Starting Your Engine 9-1
Diesel Exhaust Fluid 1-5, 9-12
Diesel Exhaust Fluid (DEF) Warning Light 5-9
Diesel Exhaust Fluid Messages 5-11
Diesel Particulate Filter 9-10
Diesel Particulate Filter Messages 5-12
Driver Information Center (DIC) 5-10

E

Electrical System
Engine Compartment Fuse Block 10-28
Engine
Air Cleaner/Filter 10-17
Check and Service Engine Soon Light 5-6
Compartment Overview 10-4
Coolant 10-21
Cooling System 10-20
Cooling System Messages . . . 5-11
Drive Belt Routing 12-4
Heater 9-9
Oil Pressure Gauge 5-5
Overheating 10-25
Power Messages 5-11
Starting Your Diesel 9-1
Engine Oil
Life System 10-10
Messages 5-11
Engines
Diesel Fuel 9-16
Exhaust Brake 9-15

F

Filter
Diesel Particulate 9-10
Replacement (Fuel).....9-31
Filter,
Engine Air Cleaner 10-17
Fluid
Automatic Transmission 10-11
Diesel Exhaust 1-5, 9-12
Fuel
Cold Weather Operation 9-25
Diesel Engines 9-16
Filling a Portable Fuel Container 9-34
Filling the Tank 9-33
Filter Replacement 9-31
Gauge 5-4
Operated Heater (FOH).....9-10
Running Out of Fuel 9-30
System Messages 5-11
Fuel (cont.)
Water in Fuel 9-26
What to Use in Canada and Mexico.....9-22
What to Use in the U.S. 9-17
Fuel for Diesel Engines 9-16
Fuses
Engine Compartment Fuse Block 10-28

G

Gauges
Engine Oil Pressure 5-5
Fuel 5-4
General Information
Service and Maintenance 11-1

H

Heater
Engine.....9-9
Fuel Operated 9-10

I

Ignition Transmission Lock Check 10-27
Instrument Cluster 5-2
Introduction ii

L

Lamps
Malfunction Indicator 5-6
Lights
Wait to Start 5-9

M

Maintenance
Records 11-12
Maintenance Schedule
Recommended Fluids and Lubricants 11-8
Scheduled Maintenance 11-2
Malfunction Indicator Lamp 5-6

Messages
Diesel Exhaust Fluid 5-11
Diesel Particulate Filter 5-12
Engine Cooling System 5-11
Engine Oil 5-11
Engine Power 5-11
Fuel System 5-11
Service Vehicle 5-12
Starting the Vehicle 5-12
Transmission 5-13
Vehicle 5-10
Vehicle Speed 5-13

O

Oil
Engine 10-7
Engine Oil Life System 10-10
Engine Oil Pressure Gauge 5-5
Messages 5-11
Overheating, Engine 10-25

P

Parking
Brake and P (Park) Mechanism Check 10-27
Over Things That Burn 9-10
Personalization
Vehicle 5-14
Power Take-Off (PTO) 9-39

R

Recommended Fluids and Lubricants 11-8
Records
Maintenance 11-12
Replacement Parts
Maintenance 11-11
Routing, Engine Drive Belt 12-4
Running Out of Fuel 9-30

S

Scheduled Maintenance 11-2
Service
Accessories and Modifications 10-1
Engine Soon Light 5-6
Maintenance Records 11-12
Maintenance, General Information 11-1
Vehicle Messages 5-12
Shift Lock Control Function Check, Automatic Transmission 10-27
Specifications and Capacities 12-2
Starter Switch Check 10-26
Starting the Vehicle
Messsages 5-12
Starting Your Diesel Engine 9-1
Supplement
Using iii

T

Towing
Trailer 9-35
Trailer Towing 9-35
Transmission
Fluid, Automatic 10-11
Messages 5-13

U

Using this Supplement iii

V

Vehicle
Canadian Owners ii
Messages 5-10
Personalization 5-14
Speed Messages 5-13

W

Wait to Start Light 5-9
Warning Light
Diesel Exhaust Fluid (DEF) 5-9
Water in Fuel 9-26
What Fuel to Use in Canada
and Mexico 9-22
What Fuel to Use in
the U.S. 9-17
Winter Cover 9-5